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An Examination of the Inter-relationships Between and Gains from, Investing in African Emerging Stock Markets

Hof, Justin

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An Examination of the Inter-relationships Between and Gains from, Investing in African Emerging Stock Markets

Justin Hof

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School of Business
University of Dundee
Dundee, Scotland
United Kingdom

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Table of Contents

List of Tables

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DECLARATION

I hereby declare that I am the author of this thesis; that the work of which this thesis is a record has been done by myself; and that it has not previously been accepted for a higher degree.

Signature:_____ Date:_____

Justin Hof

CERTIFICATION

We certify that Justin Hof has worked the equivalent of three years on this research, and that the conditions of the relevant ordinance and regulations have been fulfilled.

Signature:_____ Date:_____

Dr Suzanne Fifield

Signature:_____ Date:_____

Professor Bruce Burton

Signature:_____ Date:_____

Dr Nongnuch Tantisantiwong

Abstract

In recent years there has been a significant increase in the flow of investment into emerging equity markets. The low return correlations between this class of stock market and developed equity markets has allowed global investors the opportunity to earn higher portfolio returns while at the same time reducing overall portfolio risk. The investment climate in emerging markets has improved vastly and many of these countries have experienced superior rates of economic and capital market growth and, increasingly, they are contributing to global trade and investment. Emerging capital markets are now recognised as a distinct investment class and have become an essential component of any global investment strategy. Until recently, African stock markets were not considered as mainstream investment opportunities. However, in recent times there have been widespread structural and economic improvements in many African countries and they have sought to attract foreign investment. These changes have resulted in impressive economic and capital market growth; African markets are now becoming recognised as a legitimate investment destination and capital flows to these countries are beginning to increase.

This thesis attempts to shed light on the potential of these newly emerging African stock markets to offer UK investors the opportunity for international portfolio diversification. The analysis begins by conducting a Johansen cointegration analysis and Granger causality tests to examine the inter-relationships between African markets and the UK, in order to determine their time-varying potential for investment. The results of this analysis suggest that stock markets in Africa are weakly related to that of the UK and that opportunities for diversification could be significant.

The second part of the thesis builds upon these results and investigates the magnitude of the risk-return gains available from investing in African stock markets. In so doing, the

analysis seeks to examine, on an *ex-post* basis, whether a sample of African equity indices might have offered higher returns for relatively lower levels of risk as compared to a UK or World index only portfolio. The results of the analysis reveal that African markets can offer a UK investor risk-return gains that are significantly greater than those available from investing solely in the domestic market. This finding applied to all periods examined.

The final section in this thesis examines the gains available in African stock markets on an *ex-ante* basis. In particular, various forecasting techniques are employed in order to assume the conditions under which investors operate. Creating portfolios based on historical data and comparing the results to the theoretical gains available, the study analyses the predictability of returns in African stock markets. The findings from this *ex-ante* analysis suggest that it may be difficult for UK investors to achieve the theoretical gains available from investing in African stock markets.

Chapter One

Introduction

1.1 Introduction

In recent decades there has been a significant increase in the volume of portfolio capital invested in emerging stock markets. In particular, since the term 'emerging stock markets' was first coined in 1981, emerging stock markets have been recognised as a distinct investment class. There are now specialist unit and investment trusts which concentrate specifically on the emerging market asset class and many institutional investors are aware of the risk-return benefits these markets offer and are devoting an increasing proportion of their portfolios to these securities (Fifield et al., 1999, 2002). This increased interest in emerging markets amongst finance practitioners has led to an interest in the area amongst academics; indeed, a huge body of literature now exists which provides an overview of the various issues and benefits surrounding emerging stock market investment (Bekaert, 1995; Harvey, 1994, 1995; Fifield et al., 1999, 2002; Driessen and Laeven, 2007; Galagedera, 2012). However, despite this increase in attention among academics and practitioners, it is only in recent years that the newer emerging stock markets in Africa have begun to attract attention. The purpose of this thesis is to redress this imbalance and provide an in-depth analysis of the potential benefits from investing in this region. Many countries in Africa are endowed with natural resources and the potential for growth within these countries is huge. However, fulfilling this investment potential requires further structural changes (Anyanwu, 2006).

The remainder of this chapter is structured as follows. Section 1.2 provides a brief background to the thesis while Section 1.3 outlines the motivations for undertaking research on African stock markets and also indicates the broad objectives of the thesis. Finally, Section 1.4 outlines the structure of the thesis.

1.2 Background

The term 'emerging market' is generally used to refer to a stock market in a country whose economic development falls some way behind more established countries such as the UK and US. Indeed, the International Finance Corporation (IFC) defines an emerging market as being a stock market in a country that is in the low to middle income category[1],[2]. However, the nature of emerging markets is far more complex. While it is now well established within the academic literature that emerging economies generally record faster growth and can provide higher stock market returns compared with many developed markets, there are several fundamental issues that make investment into these markets problematic.[3] For example, traditionally there has been various barriers to entry such as restrictions on foreign ownership, minimum investment levels and withholding taxes. In addition, poor accounting systems and a lack of transparency along with issues such as political risk and illiquidity have made investments into such markets fraught with difficulty (Bekaert, 1995; Middleton et al., 2007). However, the lack of capital market integration between developed and emerging markets means that return correlations are often low and sometimes negative. This characteristic allows global investors to achieve higher returns and lower risk by including emerging markets in their investment portfolios (Speidell and Sappenfield, 1992; Barry and Lockwood, 1995; Galagedera, 2012).

In recent times, several developing countries have experienced a great improvement in their economic development. While many still suffer from issues such as poverty, inequality and a lack of adequate infrastructure, their recent economic growth has been

[1] The IFC is the private sector arm of the World Bank. It was established in 1956 with the purpose of promoting securities markets and foreign capital investment in developing countries (Fifield, 1999).
[2] A detailed review of the various definitions of an emerging stock market is given in Chapter 3 (Section 3.2).
[3] The reader is referred to Chapter 3 (Section 3.5 and Section 3.6) for an in-depth review of the potential benefits from investing in emerging stock markets.

impressive. The majority of the world's natural resources are located in emerging economies, they contribute increasingly to global trade and investment and they have accrued approximately 80 percent of the world's foreign exchange reserves (Ciravegna et al., 2013). In addition, many developed market companies are heavily reliant on sales in this group of countries and several emerging market-based companies are world leaders in a variety of sectors. Furthermore, emerging economies contributed to around 80 percent of global economic growth during 2008 to 2013 (Ciravegna et al., 2013). This growth means that it is essential for both businesses and investment managers to develop strategies which recognise their importance.

Although many African markets are regarded as 'frontier markets' their economies are developing rapidly. Despite this, investment in the African region has been hesitant due to fundamental problems such as state corruption, external debt, poor infrastructure, underemployment, poverty and many conflicts. In addition, weak regulatory frameworks, a lack of transparency, barriers to trade and investment and under-developed capital markets have discouraged foreign portfolio investment. However, in recent years, many countries have sought to implement economic and political reforms in order to encourage foreign investment (Anyanwu, 2006). For example, the number of democratic governments in Africa totalled only three in 1989, but had increased to 23 by 2008 and has led to a stricter adherence to political and civil rights, stronger political institutions and greater accountability (Radelet, 2010). The creation of new governments has also seen the implementation of successful policies which have reduced conflicts and corruption, improved social welfare and provided better infrastructure across the region. Furthermore, many African countries have reduced external debt and lowered trade and investment barriers in place (Roxburgh et al., 2010).

These social and economic changes have resulted in higher levels of economic growth and increased foreign investment. During the past decade many African countries have been

among the fastest growing in the world, with economic growth doubling that recorded during the 1980's and 1990's, surpassing growth in many East Asian countries, including Japan (Chironga et al., 2011; The Economist, 2011). In addition, levels of both foreign direct investment (FDI) and portfolio investment have improved significantly and many stock markets in Africa have been among the best performing markets in the world (Massa, 2009). This improved growth along with the excellent recent performance of several African markets, points to the growing importance surrounding this developing region. Indeed, there is a current optimism surrounding African markets which has been met with a flurry of interest among businesses and investors seeking to benefit from the rapid economic development of the region.[4] Foreign investors are becoming actively involved in many of the domestic equity and bond markets throughout the continent and private capital flows in 2010 to 2012 doubled that received during 2000 to 2007, reaching $17 billion (Alleyne and Mecagni, 2014).

1.3 Motivations and Research Objectives

There are a number factors that explain the reasons for focusing on the investment potential of African stock markets. First, and as highlighted in section 1.2, many African markets have undergone significant structural changes in order to develop their economies and encourage foreign investment. These changes have led to an increase in investment flows towards these markets. It would therefore seem that a detailed investigation into the potential benefits this group of markets can offer UK investors is particularly timely. Second, the

[4] For example, Africa Rising, which took place during 2014 explored why Africa is the landscape of the future and is an example of the positivity surrounding investment in Africa. Aimed at a wide variety of professionals including strategy directors and fund managers, the purpose of the annual conference is to bring together influential businesses and to provide information on key areas for investment, strategies for investing, and plans to improve the business climate, as well as developmental issues including agriculture, industrialisation and employability.

academic literature in this area has focused on the benefits from investing in emerging stock markets in areas such as Asia, Latin America and Central and Eastern Europe. However, there is a dearth of research which investigates African emerging stock markets. This lack of attention is a consequence of the nature of African stock markets, such as the relatively recent establishment of stock exchanges in several of the African countries, coupled with the unavailability of historical data for these stock markets which makes time series analysis very difficult. While it is clear that this lack of research is improving, there still remains many areas in which the research can be developed. Furthermore, many of the investigations into the diversification potential of African stock markets has tended to focus on the relationships between groups of markets rather than examining the level of the gains available. This thesis provides a contribution to knowledge by conducting a detailed analysis of the actual gains available from investing in these markets. Third, most of the academic research on African stock markets adopts the perspective of a US investor, and/or includes African stock markets as part of a wider investigation and/or examines only a small number of African markets. By including a selection of ten African market indices over the 15-year time period, 1996 to 2010, this thesis is able to provide a more thorough analysis of the benefits from investing in African stock markets. In addition, unlike most studies this thesis adopts the perspective of a UK investor by (i) examining the relationships between the UK stock market index and each of the ten African stock market indices and (ii) analysing the gains achieved from investing in African stock market indices and comparing them with the gains available from investing in the UK only. Finally, within the 15-year period examined there were three periods of global economic crises – namely, the 1997 Asian financial crisis, the Dot Com crisis of 2000-2002 and the 2007-2008 global credit crisis. Thus, the thesis examines the ability of African stock markets to offer global investors diversification opportunities in times of crisis.

The objectives of this thesis are threefold: (i) to determine the time-varying potential diversification benefits of African emerging stock markets for a UK investor; (ii) to evaluate the theoretical gains of a well-diversified portfolio of African stock markets compared with the more developed market of the UK and World stock market index; and (iii) to compare the theoretical and actual gains available from investing in these markets.

1.4 Structure of the Thesis

The remainder of this thesis is structured as follows. Following this introductory chapter, Chapter 2 offers an overview of African emerging stock markets. The purpose of the chapter is to provide some background on the African economic and investment environment and discern the merits of investing in these markets. In doing so, the chapter seeks to provide a detailed review of some of the issues that have hindered progress in African markets along with recent economic and stock market developments that have taken place over the past 50 – 60 years. The chapter also introduces the ten African stock markets examined in this thesis and details various economic and stock market indicators over the 1996 to 2010 period. In order to adopt the perspective of a UK investor, the performance of the African countries is compared to the UK.

Chapter 3 provides an overview of the relevant literature in order to establish the framework within which the empirical analysis was conducted. The chapter begins by establishing what constitutes an emerging stock market, how the concept differs from that of more established developed markets, and provides a brief indication of how trends towards investment in emerging markets have changed over time. Following this, the chapter introduces the theory of portfolio diversification, as pioneered by Markowitz (1952), and considers how including international securities within a well-diversified portfolio can enhance the risk-return benefits available from diversification. The chapter also provides a

detailed review of the literature on the benefits of emerging stock market investment. In this respect, two strands of the literature are considered; studies that focus on the actual gains available from investing in emerging stock markets, and analyses that examine the long- and short-term relationships between emerging stock markets. The chapter also provides a review of the literature surrounding the achievability of the investment gains. That is, the chapter considers whether investors can accurately forecast returns, variances and covariances in order to fully reap the gains available from investment. In addition, the chapter also considers the barriers and risks that may discourage investors from entering many emerging markets. Finally, the chapter provides a review of the literature relating specifically to African emerging stock markets and their potential to offer global investors an avenue for diversification.

Chapter 4 reports the findings from the first empirical analysis. The purpose of this chapter is to examine the relationships between African markets and the UK in order to determine whether African markets offer short- and long-term portfolio diversification benefits. In addition, the chapter examines the impact that three major periods of global economic crisis have had on the diversification benefits available from investing in Africa.

The analysis of the theoretical gains available from investing in African stock markets is examined in chapter 5. The aim of the chapter is to identify the level of expected returns available from a portfolio consisting of only African stock markets and to compare them with that of a UK- or World index-only portfolio. The analysis identifies the markets included in African optimal portfolios for various sub-periods during 1996 to 2010 and the mean return per unit of risk (MRPUR) ratios of the African-only portfolios are compared to that of the UK and World index only portfolio.

In order to establish whether the theoretical *ex-post* gains available from investment in African emerging stock markets, which are identified in chapter 5, are achievable in

practice, *ex-ante* African portfolios are constructed and examined in Chapter 6. Specifically, African equity portfolios are constructed using various simple forecasting strategies based on historical data and the resulting MRPUR ratio for each strategy is compared to that of the corresponding *ex-post*, UK- and World index-only portfolios.

Finally, Chapter 7 presents a number of conclusions that emerge from thesis and discusses the implications of the findings and how they contribute to the extant literature. The chapter also provides a discussion of the limitations of the research and offers a number of avenues for future research.

Chapter Two

An Overview of African Emerging Stock Markets

2.1 Introduction

Africa is a vast populous continent with an abundance of natural resources. In 2013, the population of Africa was approximately 1.10 billion, over twice the combined population of the UK and US.[5] Furthermore, the population is projected to increase to over 2.4 billion by 2050 (Population Reference Bureau, 2013). Africa is a resource rich continent housing some of the world's largest reserves of natural resources, including oil, diamonds and gold and, in 2010, the continent was the fourth largest oil producer in the world, producing 12.2 percent of the world's total. Of this, the vast majority of African oil production originates from Nigeria (2.9 percent), Angola (2.3 percent), Algeria (2.0 percent) and Libya (2.0 percent), (BP, 2011). Oil production in these African countries is the main economic export; it accounts for 95.0 percent of Nigeria's foreign exchange earnings and 85.0 percent of Angola's Gross Domestic Product (GDP) (CIA, 2012). As well as being the fourth largest producer, Africa also holds the fourth largest proven oil reserves, creating a positive outlook for the future in terms of income estimated with "reasonable certainty" (BP, 2011). Another of the most abundant natural resources in the African continent is rough diamonds.[6] The Jwaneng Mine in Botswana, run in partnership between the government of the Republic of Botswana and the De Beers diamond company, is by value the world's richest diamond mine (De Beers Group, 2012). This and the three other diamond mines in Botswana created an export total of approximately $2.9 billion in rough diamonds during 2010. Other countries, such as Angola and South Africa, also have very fruitful diamond reserves, although not as rich as in Botswana, which acts as a large boost to the overall economy.[7] Gold mining is also

[5] The population for the UK and US during 2013 was approximately 64 and 316 million, respectively (Population Reference Bureau, 2013).
[6] In 2009 Africa was responsible for 78 percent of global diamond production and held 88 percent of the total global diamond reserves (Economic Commission for Africa, 2013).
[7] Angola is Africa's second richest diamond country, exporting approximately $824 million of rough diamonds during 2010 and accounting for approximately five percent of GDP. During the same period South Africa, the

a significant industry in at least 34 African nations and the African Development Bank Group (2012) report that 20.0 percent of global gold production over the past five years has come from African countries. South Africa generates half of that figure and is currently the fourth largest producer of gold in the world producing 250 metric tonnes per annum. Africa's other main gold producing countries are Ghana which accounts for 16.0 percent of the African total and Tanzania and Mali which both account for nine percent. In fragile countries such as Tanzania and Mali, the income generated from gold is vital in sustaining the country's economic development, with each country seeing growth of seven and five percent per year respectively, from 2000 to 2010 (African Development Bank Group, 2012).[8]

Despite these vast resources Africa continues to face many challenges. While the abundance of resources within the continent should ensure both economic and financial development, they have instead resulted in environmental degradation, state corruption, poverty and violence (Turner, 2007).[9] Furthermore, approximately 70.0 percent of the countries within Africa are amongst the poorest in the world, with over half the population suffering extreme hunger and many life threatening diseases such as HIV/AIDS are prevalent. In addition, external debt problems, poor infrastructure, barriers to trade, underemployment, social-political conflict and corruption are having a detrimental impact on the levels of foreign direct investment and are, in turn, hindering economic growth and stock market development (Mkwezalamba and Chinyama, 2007). However, despite these

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third largest diamond exporter in Africa, reported exports totalling $709 million (African Development Bank Group, 2012).

[8] In addition to producing oil, diamonds and gold, the African continent is also responsible for the largest proportion of global production for Platinum (54 percent), Vanadium (51 percent), Chromium (40 percent), and Phosphate (27 percent), with respective proportions of global reserves of 60, 95, 44 and 66 percent (Economic Commission for Africa, 2013).

[9] Many natural resource rich economies record significantly lower rates of economic growth as compared to countries that lack these natural resources. It is well documented in the academic literature that having an abundance of natural resources within an economy is by no means a guarantee of superior economic growth (Sachs and Warner, 1997). However, with the African continent having such a large proportion of global reserves and production, for many non-renewable resources, investment in Africa could become essential for global investors wishing to gain exposure to these particular sectors.

problems there is much cause for optimism. In the wake of recent political reforms, the leaders of many African countries are beginning to set integration and development agendas aimed at promoting African-wide economic cooperation and development (Mkwezalamba and Chinyama, 2007). These structural changes have had a positive impact on economic development and improved the investment climate across much of Africa. In recent times the levels of both FDI and portfolio investments have increased significantly and African markets are beginning to be recognised as a promising investment opportunity (Anyanwu, 2006; Alleyne and Mecagni, 2014).

The purpose of this chapter is to provide a background to African economic and capital markets. The chapter discusses the issues that have hampered development across much of Africa and reviews the current progress that has been made to improve the investment climate and attract foreign participants into their capital markets. In addition, the ten African stock markets that are included within the empirical analyses of this thesis are introduced. Specifically, the markets included are Botswana, Egypt, Ghana, Ivory Coast, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia. In order to examine the potential for investment in these markets, the chapter also provides an overview of the economic and stock market performance of each of the African market included and compares the performance with the UK market.

The remainder of this chapter is structured as follows. Section 2.2 introduces African markets and provides an overview of their economic and financial market developments. Section 2.3 examines the economic performance of the countries included in this thesis, while Section 2.4 examines their stock market performance. Finally Section 2.5 concludes the chapter.

2.2 African Economic and Financial Market Developments

Following the Second World War a process of decolonisation began within Africa, giving many African leaders greater political power. With this process came much reason for optimism as Africa's leaders worked to develop the economic, political and cultural character of the postcolonial states (Talton, 2011). However, for much of the African continent, this new era came with many trials with regards to interdependence and globalisation. While globalisation can bring opportunities for many small underdeveloped countries, many of the weak African economies within sub-Saharan Africa experienced a reduction in their share of world trade and investment and became increasingly marginalised from the global economy. For example, during the 1960s, African goods accounted for nearly 10 percent of the world's exports. By 2000, this figure had reduced to only 2 percent, reflecting Africa's marginalisation and inability to benefit from the increasing opportunities for international trade (Economic Commission for Africa, 2006; United Nations, 2009).

In the years following independence, Africa's leaders and decision-makers, began to pursue regional economic cooperation and integration strategies in order to enhance political unity and economic growth and development.[10] The overall aim of such strategies was to create sustainable development; reduce barriers to inter-African trade; sustain production systems and markets; realise economies of scale and improve competitiveness (Economic Commission for Africa, 2006; United Nations, 2009).[11] Many inter-governmental economic cooperation organisations, known as Regional Economic Communities (REC's), were

[10] Regional integration initiatives have a long history within the African continent and date back as far as 1910 with the creation of the South African Customs Union (SACU), followed by the East African Community (EAC) in 1919 (Geda and Kibret, 2008). However despite these early developments, it was not until the creation of the Organisation for African Unity (OAU) in 1963 and various initiatives that came with this (such as the Lagos Plan of Action in 1980 and the Abuja Treaty in 1994), that progress was made in creating regional economic communities, with the ultimate aim of forming a single African Union (United Nations, 2009).

[11] Among the many challenges facing the African continent are inadequate financial resources, poor governance, macroeconomic instability, the prevalence of diseases such as HIV and AIDS and a history of conflicts and war (Economic Commission for Africa, 2011b).

established during the 1960s to 1980s, with the aim of expanding inter-regional trade; strengthening regional development; removing barriers to production; and promoting monetary cooperation and the development of regional capital markets (Economic Commission for Africa, 2006; United Nations, 2009). As of 2009, there were 11 different major REC's within Africa, each with varying levels of integration and agendas, although the purpose of each community is to promote cooperation, integration and economic coordination.[12] While each of Africa's 53 countries is a member of at least one regional economic community, each community has different objectives and strategies in place to implement the regional arrangements.[13]

Despite the steps taken towards regional economic cooperation, the success of the various economic communities has been less than satisfactory (Geda and Kibret, 2008). Many of the regional initiatives have fallen short of improving economic conditions among the member countries. Transportation costs remain high, cross-border procedures are inefficient and a lack of transparency has resulted in the amount of inter-regional trade lagging behind that of Latin America and Asia (United Nations, 2009). This failure has impeded economic growth and development in many African economies and hindered the development of efficient stock markets. The Economic Commission for Africa (2006) highlighted many different reasons for the failure of REC's in Africa. First, underlying structural issues within the REC's have hindered successful integration. For example, many

[12] As of 2009, the major African regional economic communities are the Arab Maghreb Union (UMA), the Common Market for Eastern and Southern Africa (COMESA), the Community of Sahel-Saharan States (CEN-SAD), the Economic Community of Central African States (ECCAS), the Economic Community of West African States (ECOWAS), the Inter-Governmental Authority on Development (IGAD), the Southern African Development Community (SADC), the Economic and Monetary Community of Central Africa (CEMAC), the East African Community (EAC), the Southern African Customs Union (SACU) and the West African Economic and Monetary Union (UEMOA) (United Nations, 2009).

[13] For example, the specified objective of UMA, ECCAS, ECOWAS, IGAD, SADC, CEMAC, EAC and UEMOA is to create a full economic union, while COMESA aims to create a common market, SACU a full customs union and CEN-SAD a free trade area and the integration of some sectors (United Nations, 2009).

African countries have become a member of more than one regional community.[14] Multiple membership has led to implementation issues as each community has its own agenda for achieving regional integration. Second, unlike other successful instances of regional integration, such as that within the European Union, the majority of the African REC's lack both institutional leadership and a willing regional paymaster to oversee the operations of the REC.[15] Furthermore, there is also a lack of corporate advocacy towards regional integration among many of the African communities, with the main driver of regional integration coming from the governments of the African countries themselves.[16] Unlike other successful regional integration programmes, there exists no mature business constituency for integration and many civil society organisations within Africa are yet to recognise a move towards regional integration. Third, problems with trade and policy implementation have hampered economic integration. While one motivation behind the creation of a REC is to facilitate trade amongst member countries, some of them rely heavily on income from trade taxes to fund public expenditure. This has resulted in the reluctance of many African countries to remove barriers to trade for fear of significant revenue loss. In addition, it appears that the structure of the REC's does not lend itself to the trading interests of the individual member countries, further hampering inter-regional trade. For example, during 2000 – 2007, the level of inter-regional trade recorded an average annual increase of 15.0 percent while, over the same period, the level of African-wide trade increased by an annual average of 25.0 percent,

[14] Specifically, of the 53 countries that make up the African continent, only seven countries belong to a single REC. Of the remaining 46 countries, 27 are members of two regional groups, 18 countries belong to three groups and one is a member of four different REC's (United Nations, 2009).

[15] The early success of integration within the European Union can be attributed to the willingness of Germany to take on this role. Having one of the strongest economies in the world during the mid-1990s, the model for the European Central Bank became based upon the success of the Bundesbank and, to date, Germany has been the largest net contributor to the European Union budget, which has helped to ease monetary distribution concerns (The Economic Commission for Africa, 2006).

[16] Stakeholder engagement, and perhaps more importantly corporate involvement has proved crucial in supporting regional integration both within the European Union and the North America Free Trade Agreement, where corporate groups and organisations emerged to provide support and acceptance of the regional integration (The Economic Commission for Africa, 2006).

suggesting that the trading needs of the individual countries are not confined to their specific REC's (Economic Commission for Africa, 2009).

The problems incurred by failures within the REC's have not only caused issues for economic development within Africa, but have also failed to enhance the growth of working stock exchanges (Minney, 2011). While the development of an efficient stock market has been argued to act as a boost to economic growth, as it increases investment and productivity, many of the economies within the REC's are too underdeveloped to benefit from the establishment of an efficient stock market (Massa, 2009). In addition, nationalism has also hindered the development of efficient stock exchanges. Traditionally, stock exchanges have been seen as national institutions and many of the smaller African countries value the perceived prestige of a national stock market. With many of the regions stock markets being relatively small, holding few listed companies, resulting in poor liquidity, this nationalistic approach to the stock market is among the factors currently holding back the African securities exchanges (Minney, 2011). Successful implementation of capital market integration policies within the REC's should increase the market size of African exchanges, either through cross-border listings and co-operation between national exchanges or through fully-fledged regional integration, leading to a reduction in the number of national exchanges. This would help to increase cost efficiency and liquidity, integrate information systems and reduce monitoring costs; it would also increase the supply and demand of securities, which would lead to an increase in cross-border and international capital flows (Yartey, 2007; Farid, 2013). One example where merging stock exchanges can have a positive impact is in Egypt. During 2008, the Alexandria and Cairo Stock Exchanges merged to become the Egyptian Stock Exchange, and resulted in significant improvements in technology, liquidity and efficiency. The regulatory framework was also strengthened and is now approaching international standards (European Investment Bank, 2011).

There are many additional barriers faced both within the local business environment and by potential foreign investors to the region. Financial systems represent an important component in the efficient allocation of domestic resources and, in turn, can play an important role in the promotion of economic activity and development (African Investment Initiative, 2009; Economic Commission for Africa, 2010). However, the financial systems within many African economies are among the smallest in the world, many being smaller in size than that of a mid-sized European bank, with total assets of less than US$1 billion (Beck et al., 2009). The African Investment Initiative (2009) highlighted several reasons for the weak financial systems across much of Africa. First, many African countries have weak regulatory frameworks, including a lack of transparency and creditor information, along with poor judicial systems. This has resulted in the marginalisation of many smaller, riskier firms, with bank lending tending to favour mainly larger organisations or government assets. Second, in many African countries, approximately 70 percent of the market share within the banking sector is held by three banks. This has had a negative impact on the private sector as high interest rate spreads, created by the oligopolistic banking sector, have made loans too costly.[17] In addition, many of the financial systems within Africa have a very limited outreach, with less than one in five households having access to a banking service (Beck et al., 2009). Furthermore, the requirements for setting up bank accounts in Africa make access to banking very expensive. Specifically, the minimum balance, annual fees and extensive documentation requirements in order to set up a bank account, both for current and savings account customers, represent a significant barrier to many in becoming an account holder. A final central factor hindering the development of financial markets highlighted by The

[17] For example, in 1980 the average African deposit interest rate was 6.5 percent, with a lending rate of 12.0 percent, resulting in a spread of 5.5 percent. By contrast, the respective 2005 interest rate figures had increased to 7.3 percent and 17.7 percent, giving a spread of 10.4 percent (Beck et al., 2009; Economic Report on Africa, 2010).

African Investment Initiative (2009) relates to the under-developed and illiquid nature of the capital markets within many African economies. In addition to the general characteristics of many African capital markets, such as ineffective collateral registration systems, weak contractual and commercial enforcement regulations and low income levels, the report also highlights the lack of portfolio options within the capital markets as detrimental to growth and international investment flows.

Similar issues are discussed by Kenny and Moss (1998) who provided an evaluation of the specific problems faced by African stock markets that have hindered their development. Whilst they ultimately concluded that the future for African stock markets looked optimistic and that governments within the region were beginning to embrace stock markets, their study identified three major barriers that have hindered growth in African capital markets. First, they highlighted weak economic environments within Africa as a major barrier to growth. They pointed to problems in both the financial and regulatory structures within the continent, which not only hinder the development of well-functioning stock markets, but also discourage international capital flows. Specifically, the continent lacked strong and well-organised banking and financial systems. For example, they highlighted that even in some of the most economically developed African markets, such as Ghana, the ratio of banks to people was very low. This is further exacerbated by the fact that across much of the continent it can take up to three weeks to clear a cheque. Additionally, there was a 'debt overhang' within much of the continent, with debt-export ratios of over 200 percent. This has had a devastating impact on growth as institutional budgets have been cut to meet costs and interest rates have soared precluding business expansion. African stock markets have also suffered from severe liquidity problems. Perhaps one of the main concerns relating to this issue identified by Kenny and Moss (1998) relates to the fact that many of the Bourses are only open for a couple of hours a week. In addition, it has not been uncommon

for registration to many of the stock markets to take over two months, and there have been cases of prolonged delays in share dealing, in some cases up to six months. These are not the only liquidity concerns for investors highlighted by Kenny and Moss (1998); there are also issues surrounding the composition of stock markets. For example, not only are many of the markets dominated by a handful of large companies, but the majority of shares are also held by large institutions which simply follow a buy and hold strategy, making it more difficult to liquidate investments. On top of these problems there have also been many issues within the economic environment that do not inspire confidence amongst investors. Many brokers on the continent lack sufficient resource backing[18] and local investor participation, a sign of confidence for international investors, is something that is scarce among African stock markets. In addition, many contract laws are pinpointed as being both unclear and weakly enforced.

The second barrier to African stock market growth that Kenny and Moss (1998) discuss relates to external risks such as the impact that changes in foreign investor confidence can have on markets. Due to the under-developed nature of African markets, they argued that stock markets are very unstable, rely heavily on prices of commodity exports, and are susceptible to adverse changes in investor confidence. As a result of large price swings caused by changes in demand, there is the risk of financial collapse as investors lose confidence and withdraw funds from the region. Further to this, many institutional investors buy and sell in large blocks, which could again result in large price swings within the relatively small stock markets. The results in each case could not only discourage investors and slow economic growth but could in extreme cases, result in financial collapse.

[18] Kenny and Moss (1998) gave the example of the Nairobi Stock Exchange Guarantee fund. If problems within the market lead to a broker collapse, the fall-back for investors is nearly non-existent, with only US$500 in the guarantee fund.

The final barrier to growth identified by Kenny and Moss (1998) concerns political factors. Specifically, they pointed to issues surrounding the privatisation of state-owned businesses. This procedure was not only very complex, but also required large amounts of political commitment in order to become successful. Inefficiencies in the privatisation process could lead to problems of insider trading, resulting in further stock market inefficiencies and larger more informed investors profiting at the expense of smaller non-institutional investors. The process of privatisation in African economies is also inefficient in nature; many of the companies are offered at a discount to encourage participation. Furthermore, Kenny and Moss argued that the acquisition of large market holdings by foreign investors, through insider trading and reduced prices, has had a damaging impact on the national identity of the countries, resulting in poor investor perceptions.

More recently, Moss et al. (2007) sought to explain the reasons why African markets failed to receive more equity investment. Examining the characteristics of African markets, the paper sought to establish whether there was a lack of investment in Africa due to 'market failure' or 'market works'.[19] Their findings supported the concept of 'market works' suggesting that, despite many of the barriers to investment in Africa, investors do not view the markets any differently from other emerging markets. However, the authors did suggest that in order for Africa to attract more equity investment over the long-term, there needed to be an increase in the supply of available securities within the markets.

Political issues in Africa have also acted as a barrier to economic development and investment. In particular, as many governments rule countries under single-party monopolistic rule, there is a lack of political accountability, with many government officials

[19] Moss et al. (2007) explained the view of 'market failure' as one where investors do not respond to market opportunities. Reasons cited for this include a lack of information or excessive risk. On the other hand, the view of 'market works' refers to there being nothing out of the ordinary within the market and investors view the market like any other.

abusing their position of power for personal gain, rather than adopting strategies in the best interests of development (Humphrey and Bates, 2005).[20] Furthermore, since the years of independence there have been over 200 attempts at military coups, whereby democratically elected governments have been overthrown, or attempted to be overthrown, by military forces. For example, after 20 years of constitutional democracy, during the spring of 2012, the democratically elected government of Mali was briefly overthrown by military insurgents. (Barka and Ncube, 2012).[21]

African countries have also experienced fundamental problems such as electricity shortages and transportation issues. For example, businesses report major power outages, sometimes lasting the entire working day[22], and within sub-Saharan Africa there are fewer miles of paved roads than in any other region (Ramachandran et al., 2009). Furthermore, poor transport links[23], inadequate communication networks[24] and substandard water and sanitation facilities are also barriers to economic growth and investment (Gambari, 2003; Hartzenberg, 2011). Mkwezalamba and Chinyama (2007) highlighted four additional factors that have had a negative impact on the development of many African nations. First, they discuss a number of economic challenges relating to trade and investment. While global trade should act as a facilitator for economic development and growth, many African

[20] During the 1990s, while still under Military rule, the Nigerian government under General Abacha used its position to divert over $2 billion of the country's export earnings to private foreign bank accounts (Humphrey and Bates, 2005).

[21] Other instances of successful military coups in Africa during recent times include Mauritania during 2008, Guinea during 2008, Guinea-Bissau during 2008 and 2012, and Niger during 2010 (Barka and Ncube, 2012).

[22] Nigerian companies are perhaps most affected as 40 percent of electricity is provided by private generators. Indeed, many businesses in Nigeria report that power outages occur every day of the year (Ramachandran et al., 2009).

[23] Many of the road and rail transport links on the continent were established during colonial times, with the purpose of transporting primary products to coastal ports, rather than connecting countries geographically across the continent. As a result, transport costs between African countries are among the highest in the world. For example, the cost of shipping a car from Japan to Abidjan is approximately US$1,500, while the cost of shipping the same car from Addis Ababa to Abidjan is approximately US$5,000 (Hartzenberg, 2011).

[24] Access to the internet and mobile phone penetration is still extremely poor within Africa; 94 percent of Africans do not have access to the internet and approximately 600 million lack even basic mobile phones (African Securities Exchanges Association, 2011).

countries are still largely side-lined from the rest of the world, due to financial and institutional weakness, poor trade regulations and high transaction costs of trade. Further, compared to other regions in the world, intra-African trade remains poor. For example, during 2004, intra-African trade accounted for only nine percent of the continents exports, while trade with European countries accounted for 67 percent. Problems with governance, poor macroeconomic conditions and the persistence of conflicts add to the issues of underdevelopment and have resulted in Africa's share of global foreign direct investment remaining below five percent in 2007, and concentrated in those countries which export natural resources.[25] Second, they discuss the importance of governance issues in relation to successful economic development within Africa. The lack of governance in Africa has not only been responsible for the failure of many economic and institutional reforms, it has also been the ignition for many conflicts. This inherent lack of governance has resulted in the ineffective use of the countries natural resources which are needed to promote growth and development; corruption; unfair government representation; poor rule of law; and a lack of transparency and accountability, all of which have reduced the attractiveness of many African businesses for outside investment. Third, Africa faces many social challenges. For example, while many of the world's economies saw a reduction in extreme poverty from 27.9 percent to 21.3 percent during 1990 and 2001; Africa (excluding North Africa) recorded an increase from 44.6 to 46.5 percent.[26] Furthermore, with the exception of North Africa, malnourishment and infectious diseases are common across the continent, with 8.5 percent living with HIV/AIDS in 2003, compared to less than 1 percent for the rest of the world.

[25] For example, during 2009, Morocco, whose main export is phosphoric acid and wiring, displayed a GDP per capita of $1,809, with a total GDP of $91.38 billion. During the same period, Angola, whose main export is petroleum and crude, displayed a GDP per capita of $1,313, with a total GDP of $75.49 billion. However, when comparing the levels of net foreign direct investment Angola received nearly 48 percent more foreign investment, recording $2.19 billion, compared to only $1.49 billion within Morocco (The World Bank, 2011)

[26] Mkwezalamba and Chinyama (2007) defined extreme poverty as those people who are living on less than US$1 per day.

Finally, Mkwezalamba and Chinyama (2007) argued that peace and security issues have not only increased poverty levels across much of Africa but have also diminished the capabilities of the state to focus on economic development and integration. The authors cited the on-going conflicts in Ivory Coast, Somalia, Ethiopia and the Central African Republic as examples.

Overall, these issues have impeded both economic and stock market development. For example, although the GDP *per capita* in Africa exceeded that of the developing economies in Asia as recently as 30 years ago, over the past two decades, African levels of GDP have lagged that of other developing economies.[27] Similarly, with the exception of the Johannesburg stock exchange, many African stock markets suffer from poor liquidity, small company size and a low number of listed shares (Irving, 2000).

Despite the many problems that Africa faces with regards to both economic and capital market development, there have been many recent economic improvements and political and financial reforms. Africa has become one of the fastest growing continents in the world. During the period 2000 – 2008, Africa's GDP rose by 4.9 percent each year, more than double the growth rate seen during the 1980's and 1990's, reaching a total of $1.6 trillion (Roxburgh et al., 2010). While much of this increase can be attributed to an increase in global commodity prices since the late 1990's, Roxburgh et al. (2010) highlighted that only 24 percent of the growth incurred during this period was attributable to oil and other natural resources, with the remainder of the growth coming from sectors such as banking, tourism, telecommunications and agriculture and manufacturing. Capital markets on the continent have also improved in recent years. Despite only having eight functioning stock exchanges

[27] This period has coincided with high levels of foreign aid which, as of 2006, had reached $529 billion over a 30 year period (Garner, 2006).

in 1989,[28] as of the end of 2012, there were a total of 23 operating stock markets across Africa, with a total market capitalisation reaching $1.5 trillion, in 2013. Furthermore, during 1995 - 2009 there was an African stock market in the top ten performing stock markets nearly every year. Specifically, a total of six markets were in the top ten during 2004 (Egypt, Ghana, Kenya, Mauritius, Nigeria and Uganda); Egypt, Uganda and Zambia were in the top five during 2005 and Malawi was the best performing market in 2006 (Massa, 2009).[29] This trend has continued as during 2013 the Lusaka stock exchange in Zambia and the Nigerian stock exchange were the world's fourth and sixth best performing stock markets respectively (Caldwell, 2013).

A significant development in the region has been the foundation of the African Securities Exchange Association in 1993. Since its establishment, the association has grown in membership and is currently represented by 20 exchanges covering 27 African countries. As well as providing a source for exchange of information among members, the association aims to facilitate financial integration, mobilise capital and harmonise many standards within its member countries through the development of trading and listing standards and through aiding the development of financial instruments (African Securities Exchange Association, 2012).

In recent times there have been many changes that have contributed to economic and stock market growth, such as the steps taken to improve the political environment in Africa. For example, many African nations have adopted governments through multi-party elections

[28] The early stock exchanges within the African continent included: the Egyptian Exchange, established in 1883; the Johannesburg Stock Exchange in South Africa, established in 1887; The Casablanca Stock Exchange in Morocco, established in 1929; The Nairobi Stock Exchange in Kenya, established in 1954; The Nigerian Stock Exchange, launched in 1960 as the Lagos Stock Exchange and renamed the Nigerian Stock Exchange in 1977; The Bourse de Tunis in Tunisia, established in 1969; The Stock Exchange of Mauritius, established in 1989; and the Botswana Stock Exchange, established in 1989 (Standard & Poor's, 2001)

[29] During 2004, Ghana was the world's best performing stock market, earning a yearly return in US dollar terms of 144 percent. This is in stark contrast to the performance of the Morgan Stanley Capital International Index, which during the same period earned a return of 30 percent (Yartey and Adjasi, 2007).

(Simensen 2009), and command economies have been renounced in favour of democracy (Decalo, 1992). These new governments have sought to implement policies aimed at improving macroeconomic conditions and the business environment.[30] As a result, exchange rates have stabilised, rates of inflation have decreased from a continent average of 22 percent during the 1990's to around eight percent after 2000 and combined levels of foreign debt have reduced from 82 to 59 percent of GDP (IFC, 2008; Roxburgh et al., 2010).

Other strategies put in place by government systems have resulted in improvements in social welfare, infrastructure, conflict and corruption. By 2006, over 50.0 percent of Africa's population lived within the distance of a GSM mobile phone signal, 17 countries have met, or are on target to meet, the millennium targets for water access, and approximately 80.0 percent of the transportation systems are in good or fair condition (The World Bank, 2009). Other notable improvements across the continent during 1990 - 2000 were a 43.8 and 18.1 percent increase in household's access to electric and water supply, respectively, along with significant improvements to household sanitation (BBC News, 2007). More recently, due to the creation of new economic partnerships, China has developed new infrastructure within sub-Saharan Africa and, since 2005, has exceeded the World Bank in terms of commitment to infrastructure in the region (Roxburgh et al., 2010).[31]

New governmental policies have also made substantial efforts to reduce much of the conflict and corruption within Africa, such as that resulting from illegal trade, natural resources, and price exploitation from larger, more developed nations, when importing natural resources from smaller African countries (Turner, 2007). There has been a notable

[30] For example, both Egypt and Morocco have struck free trade agreements with major export partners, while smaller countries such as Rwanda have established commercial courts in order to settle business disputes (McKinsey Global Institute, 2010).

[31] As part of a new trade agreement, China has committed to provide a $6 billion package to the Democratic Republic of Congo for infrastructure investment in roads, rail, schools and hospitals, in exchange for ten million tonnes of copper and two million tonnes of cobalt (McKinsey Global Institute, 2010).

increase in the number of organisations monitoring these processes in an attempt to reduce the exploitation and corruption in the oil, diamond and gold industries. The Organization of the Petroleum Exporting Countries (OPEC), aims to create stability across oil markets and unify petroleum policies in member countries. The organisation, which includes Africa's largest oil producers (Nigeria, Angola and Algeria) attempts to secure supply, meet demands, and provide a fair return to exporting countries (Organization of the Petroleum Exporting Countries, 2012). The potential for the accrual of wealth and power in the mining and trade of diamonds, coupled with deep poverty and civil unrest has resulted in the trade of 'conflict diamonds' which is used for rebel movements and funding war. The Kimberly Process Certification Scheme came into force in 2003 and is an international collaboration of governments, industry and civil society leaders attempting to eradicate the trade of conflict diamonds (Kimberly Process, 2012). The process has not only reduced the illegal trade of diamonds in funding war crimes but has brought some stability to countries, which have until now not reaped the benefits of the abundance of natural resources in their land.[32] In addition, the World Gold Council, which was created in 1987 includes mining companies based in Africa and aims to create a sustainable and fair gold industry (The World Gold Council, 2012).[33]

Many of the reforms which have been undertaken in African economies have coincided with an increase in private investment within the region. The levels of foreign direct investment in Africa have increased from $9 billion in 2000 to $62 billion in 2008,

[32] For example, during 2006 the government in Sierra Lione received $125 million through the export of legal diamonds. By contrast, during the 1990's, nearly all of the money generated through the sale of diamonds was used illegally to fund war, violence and rebel movements. It is now believed that 99.8 percent of the rough diamond production within Africa originates through member states of the Kimberly Process (Kimberly Process, 2012).

[33] Examples of the mines included in the World Gold Council are African Barrick the main gold producer in Tanzania; Golden Star resources Ltd, which is based in Ghana; and Gold Fields Ltd, a major mining company in South Africa.

creating levels of foreign direct investment relative to GDP which are comparable with that of China. During 2008, more than 20 African economies attracted foreign direct investment of at least $500 million and, across the continent, levels are now equivalent to approximately 16 percent of gross capital formation (Roxburgh et al., 2010). Despite the global recession during 2007 to 2009, foreign investment has remained relatively robust, largely due to the commitment of many African governments to maintain the new macroeconomic policies and reforms (*The Citizen*, 2010). Furthermore, levels of foreign investment are predicted to reach record levels of $84.3 billion during 2014, with levels of portfolio inflows, including both equity and bond investments, expected to reach $24.1 billion (Blas, 2014). Many institutional investors have begun to invest in Africa. For example, Helvetica recently launched its PEM African infrastructure fund covering ten African countries and a range of sectors including transportation, telecommunications, energy, healthcare, housing infrastructure and pharmaceuticals (O'Sullivan, 2007). Also during 2007, the Russian-based investment bank Renaissance Capital announced the launch of a billion-dollar pan-African investment fund which, coupled with other investments, resulted in a total of $3 billion being raised in private equity during 2007 (Santiso, 2007). In addition, while Africa has long held trading links with China, the intensity of this relationship has increased dramatically. Between 2001 and 2006, Africa's levels of imports to and exports from China increased by 35 and 40 percent, respectively, and China is now Africa's third largest trading partner (Wang and Bio-Tchane, 2008). Despite this increased investment, there is still a heavy reliance on development funding from developed countries. Many foreign investors are concerned that the continuation of such funding is at risk (*The Economist*, 2009), although the IFC has sought to reassure investors of its commitment to continue funding the region (Capital Business, 2009). The IFC has been involved with supporting developments within Africa, such as improving the investment climate and supporting business development for many years and,

in 2006, it became the first non-resident to issue a West African denominated bond on the continent. The bond generated $44.6 million and the funds were invested locally giving local private companies the opportunity to raise funds through the bond market (IFC, 2006). The IFC's activities in Africa in 2010 included the creation of 217,000 jobs, generating power for 6.6 million people, providing loans to over 200,000 small businesses and farmers, connecting 50 million users to telephone lines and supporting 500,000 students. These efforts continued into 2011 where the IFC helped create jobs in 31 different countries within the region, its investment in sub-Saharan Africa reached over $2 billion for the second year running, and it attracted $598 million from other investors (IFC, 2012). In 2009, the levels of nominal aid flows into Africa reached an historical high of $47.6 billion despite the impact of the financial crisis and demonstrated the commitment of donor countries to assist in the development of the African economy (Economic Commission for Africa, 2011a).

There are many plans in place that could enhance Africa's future growth and development. Despite the failure thus far of the Regional Economic Communities, African leaders have called for greater collective action with the aim of deepening regional integration. The African Union, which replaced the Organisation of African Unity in 2002, has advanced plans to accelerate African integration by establishing organisations such as the African Central Bank, the African Investment Bank, the African Court of Justice and the African Parliament. Such organisations demonstrate a commitment to the creation of an African Economic Community and potentially shorten the 34-year time frame laid out by the Abuja Treaty (Economic Commission for Africa, 2006). Furthermore, through the recognition that sustainable expansion can only be achieved through the increase of intra-African trade, it has been announced that the African Union Commission plans to operationalise Africa's free trade zone, through the merger of all regional trade blocks by 2017 (*Global Times*, 2012).

Two issues impeding the development of efficient stock markets have been the small size of many countries' local stock exchange and nationalism. However, there are signs that this may be improving. The Johannesburg Stock Exchange (JSE) of South Africa has announced its intention to merge its separate listing board (African board) with its main board, resulting in no differentiation between locally-listed companies and other African companies. This step will make it easier for local investors to invest in other African companies, as well as provide another source of capital to companies from other African countries listed on the JSE (Minney, 2012). Furthermore, recent technological advances in security trading systems may not only enhance market efficiency but could also help to answer the problem of nationalism surrounding many African stock exchanges. The development of MillenniumIT trading and depository systems, in particular the MillenniumIT Smart Order Router system, could enable trades to be routed through local exchanges, thus allowing exchanges to continue to regulate their own brokers and institutions, while allowing access to wider regional exchanges (Minney, 2010).

2.3 Economic Performance for Ten African Markets

Table 2.1 details key economic indicators for each of the ten African countries in the sample along with the developed market of the UK, over the 15 year period, 1996 to 2010. In particular, the table shows the Gross Domestic Product (GDP), Inflation, Interest Rates, Exchange Rates, FDI, Imports and Exports.[34] An analysis of the table reveals several points regarding the economic development of African markets over the period.

[34] Due to lack of consistent data it was not possible to obtain interest rate data for Ghana throughout the whole period and Morocco after 2006. Similar problems were also encountered with the Ivory Coast and Tunisia. However, in the case of these markets there was an alternative interest rate available, which was based on the money market rate.

Table 2.1: Various Economic Indicators for Ten African Emerging Markets and the UK

Market	Indicator	Year						
		1996	1997	1998	1999	2000	2001	2002
BOT	GDP US$m	4,800	5,180	5,191	5,867	5,632	6,034	6,091
	Inflation (%)	10.1	8.7	6.7	7.8	8.6	6.6	8.0
	Interest Rate	0.2	5.9	8.3	-2.5	15.4	-2.3	15.8
	Exchange Rate	5.2	5.9	6.9	7.3	7.8	8.0	9.4
	FDI US$m	71	100	95	37	57	-70	732
	Imports US$m	1,723	2,258	2,322	2,215	2,082	1,816	2,446
	Exports US$m	2,537	2,842	1,948	2,658	2,675	2,315	2,425
EGY	GDP US$m	67,630	78,437	84,829	90,711	99,839	97,632	87,851
	Inflation (%)	7.2	4.6	3.9	3.1	2.7	2.3	2.7
	Interest Rate	7.9	3.6	8.8	12.0	7.9	11.2	10.3
	Exchange Rate	5.2	5.6	5.7	5.4	5.3	5.5	7.0
	FDI US$m	636	891	1,076	1,065	1,235	510	647
	Imports US$m	13,019	13,211	16,166	16,022	13,963	12,750	12,496
	Exports US$m	3,535	3,921	3,130	3,559	4,675	4,127	4,687
GHA	GDP US$m	6,933	6,891	7,482	7,718	4,983	5,315	6,166
	Inflation (%)	46.6	27.9	14.6	12.4	25.2	32.9	14.8
	Interest Rate	---	---	---	---	---	---	---
	Exchange Rate	0.3	0.3	0.4	0.4	0.8	1.0	1.2
	FDI US$m	120	82	167	244	166	89	59
	Imports US$m	2,111	2,329	2,566	3,483	2,976	3,156	2,720
	Exports US$m	1,671	1,637	1,797	1,896	1,318	1,716	1,850
IVC	GDP US$m	12,139	11,722	12,783	12,556	10,417	10,545	11,487
	Inflation (%)	2.5	4.0	4.7	0.8	2.5	4.3	3.1
	Interest Rate	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	Exchange Rate	798.1	955.5	977.0	996.2	1077.2	1055.3	1044.6
	FDI US$m	269	415	380	324	235	273	213
	Imports US$m	2,816	2,756	2,991	2,887	2,487	2,545	2,599
	Exports US$m	4,279	4,150	4,395	4,298	3,614	3,650	5,275
KEN	GDP US$m	12,046	13,116	14,093	12,896	12,691	12,987	13,149
	Inflation (%)	8.9	11.4	6.7	5.7	10.0	5.7	2.0
	Interest Rate	-5.8	16.9	21.1	17.5	15.3	17.8	17.4
	Exchange Rate	89.3	91.0	99.5	116.7	117.4	111.1	117.4
	FDI US$m	109	62	27	52	111	5	28
	Imports US$m	2,949	3,279	3,198	2,832	3,106	3,192	3,245
	Exports US$m	2,068	2,054	2,008	1,747	1,734	1,944	2,116
MAU	GDP US$m	4,422	4,187	4,170	4,291	4,583	4,537	4,767
	Inflation (%)	6.6	6.8	6.8	6.9	4.2	5.4	6.5
	Interest Rate	12.9	13.1	12.1	15.5	18.3	13.1	14.3
	Exchange Rate	31.0	34.2	40.4	40.0	39.5	41.0	45.1
	FDI US$m	37	55	12	49	266	-28	32
	Imports US$m	2,289	2,189	2,073	2,247	2,207	1,987	2,159
	Exports US$m	1,802	1,592	1,645	1,588	1,810	1,628	1,801

The table details various economic indicators for ten African emerging markets and the UK over the period 1996 – 2010. GDP refers to Gross Domestic Product and Interest Rate refers to the lending interest rate adjusted for inflation. The exchange rate is the average annual exchange rate of the local currency against UK Sterling. FDI refers to the net inflows of foreign investment to acquire ten percent or more of voting stock. Finally, imports and exports refer to all movable goods in and out of the local economy. Source: World Bank Databank and Datastream.

Table 2.1 Continued: Various Economic Indicators for Ten African Emerging Markets and the UK

Market	Indicator	Year						
		1996	1997	1998	1999	2000	2001	2002
MOR	GDP US$m	36,639	33,415	40,022	39,734	37,021	37,725	40,416
	Inflation (%)	3.0	1.0	2.8	0.7	1.9	0.6	2.8
	Interest Rate	10.6	9.6	1.2	12.6	14.0	12.4	11.9
	Exchange Rate	13.5	15.7	16.2	15.9	15.9	16.7	16.2
	FDI US$m	76	4	12	3	221	144	79
	Imports US$m	9,704	9,526	10,290	10,058	11,534	11,038	11,864
	Exports US$m	6,881	7,032	7,153	6,995	7,185	7,144	7,849
NIG	GDP US$m	35,299	36,229	32,144	34,776	45,983	48,000	59,117
	Inflation (%)	29.3	8.5	10.0	6.6	6.9	18.9	12.9
	Interest Rate	-12.5	16.2	25.1	7.1	-12.2	11.5	-5.1
	Exchange Rate	130.9	140.0	144.9	157.6	156.7	159.1	179.9
	FDI US$m	1,593	1,539	1,051	1,005	1,140	1,191	1,874
	Imports US$m	6,438	9,501	9,211	8,588	8,721	11,586	7,547
	Exports US$m	16,154	15,207	9,855	13,856	20,975	17,261	15,107
SAF	GDP US$m	143,732	148,814	134,296	133,184	132,878	118,479	111,101
	Inflation (%)	7.4	8.6	6.9	5.2	5.3	5.7	9.2
	Interest Rate	10.6	11.0	13.1	10.2	5.2	5.7	4.5
	Exchange Rate	6.7	7.5	9.2	9.5	10.5	11.4	15.5
	FDI US$m	816	3,811	550	1,503	969	7,270	1,480
	Imports US$m	30,182	32,998	29,242	26,696	29,695	28,248	29,380
	Exports US$m	29,221	31,027	26,362	26,707	29,983	29,265	29,722
TUN	GDP US$m	19,587	20,746	21,803	22,944	21,473	22,066	23,142
	Inflation (%)	3.7	3.7	3.1	2.7	3.0	2.0	2.7
	Interest Rate	8.6	6.9	6.9	6.0	5.9	6.0	5.9
	Exchange Rate	1.5	1.8	1.9	1.9	2.0	2.1	2.1
	FDI US$m	238	339	650	350	752	452	791
	Imports US$m	7,701	7,948	8,350	8,475	8,567	9,529	9,526
	Exports US$m	5,517	5,560	5,738	5,872	5,850	6,621	6,871
UK	GDP US$m	1,219,541	1,358,895	1,456,032	1,502,784	1,477,201	1,470,599	1,611,763
	Inflation (%)	2.5	1.8	1.6	1.3	0.8	1.2	1.3
	Interest Rate	2.3	6.6	5.1	3.3	5.3	3.6	1.4
	FDI US$m	27,390	37,505	74,652	89,337	122,157	53,842	25,532
	Imports US$m	282,475	301,739	307,851	315,896	334,228	331,567	351,636
	Exports US$m	261,247	281,537	271,723	268,884	284,378	272,279	279,866

The table details various economic indicators for ten African emerging markets and the UK over the period 1996 – 2010. GDP refers to Gross Domestic Product and Interest Rate refers to the lending interest rate adjusted for inflation. The exchange rate is the average annual exchange rate of the local currency against UK Sterling. FDI refers to the net inflows of foreign investment to acquire ten percent or more of voting stock. Finally, imports and exports refer to all movable goods in and out of the local economy. Source: World Bank Databank and Datastream.

Table 2.1 Continued: Various Economic Indicators for Ten African Emerging Markets and the UK

Market	Indicator	Year							
		2003	2004	2005	2006	2007	2008	2009	2010
BOT	GDP US$m	8,087	10,049	10,255	11,255	12,376	13,473	11,474	14,859
	Inflation (%)	9.2	7.0	8.6	11.6	7.1	12.7	8.0	7.0
	Interest Rate (%)	19.1	4.2	5.8	-2.3	5.3	-1.0	21.2	-2.8
	Exchange Rate	8.5	8.5	10.1	11.2	12.4	13.1	11.5	10.4
	FDI US$m	771	748	492	751	647	902	824	265
	Imports US$m	2,449	3,237	3,232	3,086	4,067	5,211	4,705	5,657
	Exports US$m	2,810	3,513	4,425	4,529	5,174	4,951	3,456	4,693
EGY	GDP US$m	82,924	78,845	89,686	107,484	130,478	162,818	188,984	218,894
	Inflation (%)	4.5	11.3	4.9	7.6	9.3	18.3	11.8	11.3
	Interest Rate (%)	6.3	1.5	6.5	4.9	-0.1	0.1	0.7	0.8
	Exchange Rate	10.0	11.3	10.6	10.5	11.4	10.6	9.2	8.4
	FDI US$m	237	1,253	5,376	10,043	11,578	9,495	6,712	6,386
	Imports US$m	10,878	12,831	19,816	20,722	27,063	48,775	44,946	52,923
	Exports US$m	6,163	7,683	10,652	13,694	16,200	26,246	23,062	26,438
GHA	GDP US$m	7,633	8,881	10,732	20,410	24,758	28,528	25,978	32,174
	Inflation (%)	26.7	12.6	15.1	10.9	10.7	16.5	19.3	10.7
	Interest Rate (%)	---	---	---	---	---	---	---	---
	Exchange Rate	1.4	1.7	1.7	1.7	1.9	1.9	2.2	2.2
	FDI US$m	137	139	145	636	1,383	2,715	2,373	2,527
	Imports US$m	3,210	4,074	5,347	6,754	8,061	10,269	8,046	10,922
	Exports US$m	2,324	2,450	2,802	3,727	4,195	5,270	5,840	7,960
IVC	GDP US$m	13,737	15,481	16,363	17,367	19,796	23,414	23,042	22,921
	Inflation (%)	3.4	1.4	3.9	2.5	1.9	6.3	1.0	1.7
	Interest Rate (%)	5.0	5.0	5.0	5.0	3.9	3.9	3.5	3.3
	Exchange Rate	948.9	967.2	959.0	962.1	959.0	823.2	735.6	765.3
	FDI US$m	165	283	349	351	443	466	396	358
	Imports US$m	3,279	4,715	5,865	5,820	6,683	7,884	7,021	7,858
	Exports US$m	5,788	6,919	7,697	8,477	8,669	10,390	10,324	10,279
KEN	GDP US$m	14,904	16,096	18,738	22,502	27,237	30,519	30,580	32,198
	Inflation (%)	9.8	11.6	10.3	14.5	9.8	26.2	9.2	4.0
	Interest Rate (%)	9.8	5.0	7.6	5.4	7.3	0.5	5.2	11.9
	Exchange Rate	123.7	144.4	139.4	136.4	133.0	127.4	128.0	119.7
	FDI US$m	82	46	21	51	729	96	116	186
	Imports US$m	3,725	4,553	6,149	7,311	8,989	11,074	10,207	12,074
	Exports US$m	2,411	2,684	3,293	3,437	4,080	4,972	4,463	5,150
MAU	GDP US$m	5,610	6,386	6,284	6,507	7,792	9,641	8,825	9,724
	Inflation (%)	3.9	4.7	4.9	8.9	8.8	9.7	2.6	2.9
	Interest Rate (%)	14.5	14.1	16.1	13.1	9.1	4.7	9.5	6.9
	Exchange Rate	47.6	51.2	53.1	56.3	62.3	53.6	53.2	48.2
	FDI US$m	63	14	42	107	341	378	257	431
	Imports US$m	2,363	2,771	3,157	3,627	3,894	4,651	3,733	4,386
	Exports US$m	1,898	1,993	2,138	2,329	2,238	2,384	1,939	2,261

The table details various economic indicators for ten African emerging markets and the UK over the period 1996 – 2010. GDP refers to Gross Domestic Product and Interest Rate refers to the lending interest rate adjusted for inflation. The exchange rate is the average annual exchange rate of the local currency against UK Sterling. FDI refers to the net inflows of foreign investment to acquire ten percent or more of voting stock. Finally, imports and exports refer to all movable goods in and out of the local economy. Source: World Bank Databank and Datastream.

Table 2.1 Continued: Various Economic Indicators for Ten African Emerging Markets and the UK

Market	Indicator	Year							
		2003	2004	2005	2006	2007	2008	2009	2010
MOR	GDP US$m	49,823	56,948	59,524	65,637	75,226	88,883	90,908	90,805
	Inflation (%)	1.2	1.5	1.0	3.3	2.0	3.7	1.0	1.0
	Interest Rate (%)	11.7	10.4	9.9	..	..	..	..	..
	Exchange Rate £	15.6	16.5	16.5	16.1	16.6	14.5	13.3	13.3
	FDI US$m	2,313	787	1,620	2,366	2,807	2,466	1,970	1,241
	Imports US$m	14,250	17,822	20,790	23,980	32,010	42,366	32,881	35,385
	Exports US$m	8,778	9,925	11,190	12,744	15,340	20,345	14,054	17,765
NIG	GDP US$m	67,656	87,845	112,248	145,428	165,921	207,118	168,568	202,523
	Inflation (%)	14.0	15.0	17.9	8.2	5.4	11.6	11.5	13.7
	Interest Rate (%)	8.6	-1.3	-1.5	-2.2	11.6	4.1	23.9	5.4
	Exchange Rate £	218.0	242.7	246.4	234.7	254.4	232.6	244.4	224.3
	FDI US$m	2,005	1,874	4,983	4,854	6,035	8,197	8,555	6,049
	Imports US$m	10,853	14,164	21,314	26,760	37,576	42,378	33,906	44,235
	Exports US$m	19,887	31,148	55,145	57,444	65,133	80,615	56,742	84,000
SAF	GDP US$m	168,219	219,093	247,052	261,007	286,169	275,279	282,754	363,910
	Inflation (%)	5.9	1.4	3.4	4.6	7.1	11.5	7.1	4.3
	Interest Rate (%)	8.9	4.6	4.9	4.4	4.7	5.7	4.2	1.6
	Exchange Rate £	13.2	11.5	12.3	13.4	14.2	15.8	13.4	11.2
	FDI US$m	783	701	6,522	-184	5,737	9,645	5,354	1,224
	Imports US$m	40,159	53,758	62,216	77,991	88,630	101,640	74,054	94,226
	Exports US$m	36,482	46,153	51,623	58,174	69,787	84,488	62,627	81,822
TUN	GDP US$m	27,453	31,183	32,283	34,377	38,934	44,880	43,522	44,291
	Inflation (%)	2.7	3.6	2.0	4.5	3.4	4.9	3.5	4.4
	Interest Rate (%)	5.1	5.0	5.0	5.1	5.2	5.2	4.3	4.4
	Exchange Rate £	2.1	2.3	2.4	2.4	2.6	2.3	2.2	2.2
	FDI US$m	541	594	723	3,270	1,532	2,638	1,595	1,401
	Imports US$m	10,910	12,818	13,177	15,043	19,101	24,622	19,241	22,218
	Exports US$m	8,027	9,685	10,494	11,694	15,163	19,319	14,449	16,427
UK	GDP US$m	1,860,312	2,201,417	2,280,539	2,444,579	2,812,875	2,635,955	2,171,386	2,261,713
	Inflation (%)	1.4	1.3	2.1	2.3	2.3	3.6	2.2	3.3
	Interest Rate (%)	1.3	1.9	2.4	1.4	3.2	1.4	-1.0	-2.3
	FDI US$m	27,612	57,334	177,405	154,120	202,071	93,506	72,924	52,968
	Imports US$m	387,254	461,140	509,044	588,247	622,018	641,596	484,908	563,340
	Exports US$m	307,799	349,652	384,318	447,589	442,279	468,139	356,350	410,891

The table details various economic indicators for ten African emerging markets and the UK over the period 1996 – 2010. GDP refers to Gross Domestic Product and Interest Rate refers to the lending interest rate adjusted for inflation. The exchange rate is the average annual exchange rate of the local currency against UK Sterling. FDI refers to the net inflows of foreign investment to acquire ten percent or more of voting stock. Finally, imports and exports refer to all movable goods in and out of the local economy. Source: World Bank Databank and Datastream.

First, the economic growth of the African economies is much higher than that of the UK; the table shows that although the combined level of GDP in all African markets lags that of the UK, the individual African country GDP increased at a much faster rate. For example, over the whole period Nigeria recorded the highest percentage of GDP growth at 474 percent, increasing from $35.3 billion in 1996 to $202.5 billion in 2010. This was followed closely by Ghana, whose GDP over the same period grew by 364 percent, increasing from $6.9 billion in 1996 to $32.2 billion in 2010. Ivory Coast recorded the lowest rate of growth in GDP among the African markets, of 89 percent; it increased from $12.1 billion in 1996 to $22.9 billion in 2010. By contrast, UK GDP increased by just over 85 percent, from $1.22 trillion in 1996 to $2.26 trillion in 2010. The table also shows that during the global financial crisis between 2007 and 2010, all African markets outperformed the UK, which displayed negative growth of 19.6 percent. Egypt was the best performing economy during this period and achieved an increase in GDP of 67.7 percent, rising from $130.5 billion in 2007 to $218.9 billion in 2010.

Second, economic stability within many of the African countries has improved over the sample period. For example, while the exchange rates in many of the African countries weakened between 1996 and 2004, there is evidence to suggest that currencies stabilised between 2005 and 2010. That is, each of the African markets recorded a weakening of their local currency against the UK pound between 1996 and 2004. Ghana and Egypt experienced the largest depreciation of 545 and 115 percent, respectively, as their currencies rose from 0.26 to 1.65 Ghanaian cedi per Sterling and from 5.24 to 11.27 Egyptian pounds per Sterling. However, since 2005, African currencies have stabilised and, with the exception Ghana, whose currency rose a further 34 percent, exchange rates among the remaining African countries have remained approximately at their 2005 levels. Indeed, despite the slight rise

of 2.8 percent in the Botswana Pula against Sterling, all other African countries recorded a strengthening of their currencies against UK Sterling by the end of 2010. It is interesting to note the strength of African currencies compared to Sterling during the global crisis between 2007 and 2010. With the exception of only Ghana, all currencies appreciated against Sterling, with Egypt experiencing the highest appreciation of 26 percent from 11.36/£ to 8.40/£. Furthermore, many of the African markets experienced price stability over the period considered. With the exception of Egypt, which recorded an increase in inflation from 7.19 percent in 1996 to 11.27 percent in 2010, all African markets recorded a decrease in inflation over the period, with many rates comparable to that of the UK.

Third, the levels of FDI inflows into the Africa has increased significantly over the sample period. Ghana, Morocco and Mauritius recorded the largest increase with levels of FDI rising from $120, $76 and $37 million in 1996 to $2,527, $1,241 and $431 million in 2010, respectively. These figures represent growth rates of 2006, 1533 and 1065 percent, respectively. This increased FDI reflects the improvements in the investment climate that has occurred within many of the African countries and highlights the openness of these countries to foreign investment (Anyanwu, 2006). However, it is clear from the table that the global financial crisis of 2007 - 2010 had a negative impact on FDI into Africa. Between 2006 and 2008, many African countries in the sample registered their highest levels of FDI but, since this time, FDI has decreased significantly. The countries worst affected were South Africa, Kenya and Botswana, whose levels of FDI fell by 78.6, 74.5 and 59.0 percent, respectively, between 2007 and 2010.

Finally, an analysis of imports and exports in Table 2.1 reveals that growth in overall trade within many of the African countries has become comparable to that of the UK. For example, over the whole sample period, the level of exports from the UK increased by 57.3 percent. On examination of the African markets, only Mauritius failed to outperform this

level of export growth; exports increased by only 24.9 percent between 1996 and 2010. A similar pattern is also evident for imports. Again, Mauritius was the only African country that underperformed the import growth of the UK. However, growth in imports suggests that countries are becoming more dependent on others. This point is reflected by examining net trade (exports minus imports) for each country. With the exception of Botswana, Ivory Coast, Nigeria and South Africa, which are heavy exporters of natural resources and commodities (African Economic Outlook, 2011; CIA, 2012), all African countries recorded a higher level of imports each year, as compared to exports. In addition, an examination of the period 2003 – 2009 reveals that the global financial crisis had a significant impact on levels of trade in the majority of African economies. During 2003 – 2008, with the exception of Botswana and Ivory Coast in 2006 and Mauritius in 2007, all African markets experienced consecutive increases in the levels of both imports and exports. However, during 2009 the effects of the global crisis impacted the African markets; imports and exports decreased in all markets with the exception of Ghana which recorded a slight increase in exports.[35] The impact of the crisis was relatively short lived among many African markets, as from 2009 - 2010, imports and exports returned to or exceeded pre-crisis levels.

2.4 Stock Market Performance for Ten African Markets

Table 2.2 details key stock market indicators for each of the ten African countries and the UK over the 15-year period 1996 to 2010. In particular, the table details the number of domestically-listed companies on the stock exchange (No. Companies); the market

[35] Berman and Martin (2010) provide further evidence suggesting that the banking crisis had a dramatic impact on the level of exports from Africa. They highlighted that the underdeveloped nature of the banking systems across much of Africa largely shielded countries from the impact of 'toxic assets', resulting in a less significant impact of the crisis compared with other markets. However, they noted that the level of imports to the US from Africa declined by 2.3 percent in the year of the financial crisis, followed by a further 8.0 percent decline in the following year. They also argued that African markets suffer more of an impact on exports if the country they are exporting to is going through a recession. In addition, the impact is more severe if the importer country is industrialised.

capitalisation of the domestically-listed companies (Market Cap) measured in millions of US dollars; value traded within the stock exchange; value traded as a percentage of total GDP (percent GDP Traded); turnover ratio (T'Over Ratio); and the level of portfolio investment (Port Invested).[36] Initial observations from the table clearly show the difference in size between the African emerging stock markets and the UK. For example, the largest African market in 1996 in terms of number of listed companies, was Egypt with 649 domestically listed companies, followed closely by South Africa with 626. Botswana had the smallest number of domestic companies, with only 12 listed in 1996. By contrast, the UK had 2,171 domestically-listed companies in 1996, which was much higher than all African stock markets combined (2,056). However, many of the African stock markets have increased the number of listed companies during the period. For example, Botswana nearly doubled its listings to 21 companies by 2010, while Nigeria had more listed companies than Egypt, with 215 and 213 domestic listings, respectively.[37] The largest stock market in 1996 was South Africa (with a capitalisation of $241.6 billion). This was followed by Egypt with a market capitalisation of $14.1 billion.[38] By contrast, the smallest market was the Botswana stock market with a capitalisation of $326 million. The difference in size between the South African market and the other African markets continued through to 2010, where the stock market capitalisation of South Africa reached $1.01 trillion, and Egypt remained the second largest with a capitalisation of $82.49 billion.

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[36] Portfolio investment is net and includes portfolio investment coming into Africa less investment by Africans into overseas markets.

[37] The drastic reduction in the number of companies listed on the Egyptian exchange since 2002 is a reflection of the strategies put in place by the exchange to improve efficiency. In particular, the exchange began delisting companies that violated exchange rules or that were inactive (European Investment Bank, 2011).

[38] This gulf in size between South Africa and the remaining emerging African markets is unsurprising given that it is generally accepted to be the most developed of the markets within the African continent, and within certain definitions is excluded from the emerging category (Fifield, 1999).

Table 2.2 Various Stock Market Indicators for Ten African Emerging Markets and the UK

Market	Stock Market Indicator	Year						
		1996	1997	1998	1999	2000	2001	2002
BOT	No. Companies	12	12	14	15	16	16	18
	Market Cap US$m	326	614	724	1,052	978	1,269	1,723
	Val Traded US$m	31	59	70	38	47	65	55
	% GDP Traded	0.6	1.1	1.3	0.6	0.8	1.1	0.9
	T'Over Ratio	8.6	12.6	10.5	4.2	4.7	5.8	3.7
	Port Invest US$m	-7	-18	-57	-30	-40	63	-224
EGY	No. Companies	649	654	861	1,033	1,076	1,110	1,148
	Market Cap US$m	14,173	20,830	24,381	32,838	28,741	24,335	26,094
	Val Traded US$m	2,463	5,859	5,028	9,038	11,120	3,897	2,558
	% GDP Traded	3.6	7.5	5.9	10.0	11.1	4.0	2.9
	T'Over Ratio	22.1	33.5	22.2	31.6	36.1	14.7	10.1
	Port Invest US$m	545	816	-600	595	266	1,461	-678
GHA	No. Companies	21	21	21	22	22	22	24
	Market Cap US$m	1,492	1,138	1,384	916	502	528	740
	Val Traded US$m	17	49	60	25	10	13	11
	% GDP Traded	0.25	0.71	0.8	0.32	0.2	0.25	0.18
	T'Over Ratio	1.1	3.7	4.8	2.1	1.4	2.6	1.8
	Port Invest US$m	---	---	---	---	---	---	---
IVC	No. Companies	31	35	35	38	41	38	38
	Market Cap US$m	914	1,276	1,818	1,514	1,185	1,165	1,328
	Val Traded US$m	20	24	40	85	33	8	16
	% GDP Traded	0.2	0.2	0.3	0.7	0.3	0.1	0.1
	T'Over Ratio	2.2	2.2	2.6	5.1	2.5	0.7	1.3
	Port Invest US$m	---	---	---	---	---	---	---
KEN	No. Companies	56	58	58	57	57	57	57
	Market Cap US$m	1,846	1,824	2,024	1,409	1,283	1,050	1,423
	Val Traded US$m	67	106	79	74	47	40	36
	% GDP Traded	0.6	0.8	0.6	0.6	0.4	0.3	0.3
	T'Over Ratio	3.6	5.8	4.1	4.3	3.5	3.4	2.9
	Port Invest US$m	-50	-89	-38	-21	-14	-1	-5
MAU	No. Companies	40	40	40	41	40	40	40
	Market Cap US$m	1,676	1,665	1,849	1,642	1,331	1,063	1,328
	Val Traded US$m	78	135	101	76	75	112	57
	% GDP Traded	1.8	3.2	2.4	1.8	1.6	2.5	1.2
	T'Over Ratio	5.2	8.1	5.7	4.4	5.1	9.3	4.8
	Port Invest US$m	35	-66	15	44	-139	-19	-17

The table details various stock market indicators for ten African emerging markets and the UK over the period 1996 – 2010. No. Companies refers to the number of domestic listed companies, while Market Cap details the total market value of all listed companies based on the company's share price multiplied by the number of shares in issue. The Value Traded and % GDP Traded refer to the total value of shares traded during the period and the value of shares traded as a percentage of the markets GDP, respectively. The turnover ratio is the total value of shares traded divided by the average market capitalisation and Port Invest refers to the net amount invested in equity and debt securities. Source: World Bank Databank and Datastream.

Table 2.2 Continued: Various Stock Market Indicators for Ten African Emerging Markets and the UK

Market	Stock Market Indicator	Year						
		1996	1997	1998	1999	2000	2001	2002
MOR	No. Companies	47	49	53	55	53	55	55
	Market Cap US$m	8,705	12,177	15,676	13,695	10,899	9,087	8,591
	Val Traded US$m	432	1,048	1,390	2,530	1,094	974	587
	% GDP Traded	1.2	3.1	3.5	6.4	3.0	2.6	1.5
	T'Over Ratio	5.9	10.0	10.0	17.2	8.9	9.7	6.6
	Port Invest US$m	142	38	24	6	18	-7	-8
NIG	No. Companies	183	182	186	194	195	194	195
	Market Cap US$m	3,560	3,646	2,887	2,940	4,237	5,404	5,740
	Val Traded US$m	72	132	160	145	263	496	475
	% GDP Traded	0.2	0.4	0.5	0.4	0.6	1.0	0.8
	T'Over Ratio	2.6	3.7	4.9	5.0	7.3	10.3	8.5
	Port Invest US$m	-173	-67	-8	11	502	832	134
SAF	No. Companies	626	642	668	668	616	542	450
	Market Cap US$m	241,571	232,069	170,252	262,478	204,952	139,750	184,622
	Val Traded US$m	27,202	44,722	58,347	72,917	77,494	69,676	78,831
	% GDP Traded	18.9	30.1	43.4	54.7	58.3	58.8	71.0
	T'Over Ratio	10.4	18.9	29.0	33.7	33.2	40.4	48.6
	Port Invest US$m	2,445	6,687	4,294	8,686	-1,864	-8,302	-417
TUN	No. Companies	30	34	38	44	44	46	47
	Market Cap US$m	4,263	2,321	2,268	2,706	2,828	2,303	2,131
	Val Traded US$m	281	260	188	420	626	316	221
	% GDP Traded	1.4	1.3	0.9	1.8	2.9	1.4	1.0
	T'Over Ratio	6.9	7.9	8.2	16.9	22.6	12.3	10.0
	Port Invest US$m	62	109	33	10	-20	-15	6
UK	No. Companies	2,171	2,157	2,087	1,945	1,904	1,923	2,405
	Market Cap US$m	1,740,246	1,996,225	2,374,273	2,933,280	2,576,992	2,164,716	1,864,262
	Val Traded US$m	578,471	829,131	1,167,382	1,377,859	1,835,278	1,861,131	1,909,716
	% GDP Traded	47.4	61.0	80.2	91.7	124.2	126.6	118.5
	T'Over Ratio	36.8	44.4	53.4	51.9	66.6	78.5	94.8
	Port Invest US$m	-25,372	-41,347	-18,073	137,014	170,911	-65,677	75,543

The table details various stock market indicators for ten African emerging markets and the UK over the period 1996 – 2010. No. Companies refers to the number of domestic listed companies, while Market Cap details the total market value of all listed companies based on the company's share price multiplied by the number of shares in issue. The Value Traded and % GDP Traded refer to the total value of shares traded during the period and the value of shares traded as a percentage of the markets GDP, respectively. The turnover ratio is the total value of shares traded divided by the average market capitalisation and Port Invest refers to the net amount invested in equity and debt securities. Source: World Bank Databank and Datastream.

Table 2.2 Continued: Various Stock Market Indicators for Ten African Emerging Markets and the UK

Market	Stock Market Indicators	Year							
		2003	2004	2005	2006	2007	2008	2009	2010
BOT	No. Companies	19	18	18	18	18	20	20	21
	Market Cap	2,131	2,548	2,437	3,947	5,887	3,556	4,278	4,076
	Val Traded	87	50	45	73	110	144	103	140
	% GDP Traded	1.1	0.5	0.4	0.6	0.9	1.1	0.9	0.9
	T'Over Ratio	4.5	2.1	1.8	2.3	2.2	3.1	2.6	3.4
	Port Invest US$m	-249	-421	-193	-557	-212	293	366	415
EGY	No. Companies	967	792	744	603	435	373	305	213
	Market Cap	27,073	38,516	79,672	93,477	139,289	85,885	89,953	82,495
	Val Traded	3,278	5,608	25,392	47,461	53,081	69,639	52,813	37,111
	% GDP Traded	4.0	7.1	28.3	44.2	40.7	42.8	27.9	17.0
	T'Over Ratio	12.3	17.1	43.0	54.8	45.6	61.9	60.1	43.0
	Port Invest US$m	-43	239	3,468	-700	-3,574	-7,650	-527	10,442
GHA	No. Companies	25	29	30	32	32	35	35	35
	Market Cap	1,426	2,644	1,661	3,233	2,380	3,394	2,508	3,531
	Val Traded	45	66	68	52	109	150	58	102
	% GDP Traded	0.6	0.7	0.6	0.3	0.4	0.5	0.2	0.3
	T'Over Ratio	4.2	3.2	3.2	2.1	3.9	5.2	2.0	3.4
	Port Invest US$m	---	---	---	---	---	---	---	---
IVC	No. Companies	38	39	39	40	38	38	38	38
	Market Cap	1,650	2,083	2,327	4,155	8,353	7,071	6,141	7,099
	Val Traded	24	47	31	107	157	315	133	132
	% GDP Traded	0.2	0.3	0.2	0.6	0.8	1.4	0.6	0.6
	T'Over Ratio	1.6	2.5	1.4	3.3	2.5	4.1	2.0	2.0
	Port Invest US$m	---	---	---	---	---	---	---	---
KEN	No. Companies	51	47	47	51	51	53	55	55
	Market Cap	4,178	3,891	6,384	11,378	13,387	10,917	10,756	14,461
	Val Traded	209	345	505	1,300	1,318	1,438	497	1,084
	% GDP Traded	1.4	2.1	2.7	5.8	4.8	4.7	1.6	3.4
	T'Over Ratio	7.5	8.5	9.8	14.6	10.6	11.8	4.6	8.6
	Port Invest US$m	-38	-66	-30	-21	-25	-26	-21	-18
MAU	No. Companies	40	41	42	41	90	89	89	86
	Market Cap US$m	1,955	2,379	2,617	3,598	5,666	3,443	4,740	6,506
	Val Traded US$m	99	95	151	137	369	403	330	357
	% GDP Traded	1.8	1.5	2.4	2.1	4.7	4.2	3.7	3.7
	T'Over Ratio	6.0	4.4	6.0	4.4	8.0	8.9	8.1	6.4
	Port Invest US$m	-18	-37	-16	-30	58	-170	-56	-184

The table details various stock market indicators for ten African emerging markets and the UK over the period 1996 – 2010. No. Companies refers to the number of domestic listed companies, while Market Cap details the total market value of all listed companies based on the company's share price multiplied by the number of shares in issue. The Value Traded and % GDP Traded refer to the total value of shares traded during the period and the value of shares traded as a percentage of the markets GDP, respectively. The turnover ratio is the total value of shares traded divided by the average market capitalisation and Port Invest refers to the net amount invested in equity and debt securities. Source: World Bank Databank and Datastream.

Table 2.2 Continued: Various Stock Market Indicators for Ten African Emerging Markets and the UK

Market	Stock Market Indicators	Year							
		2003	2004	2005	2006	2007	2008	2009	2010
MOR	No. Companies	53	52	56	65	74	77	78	73
	Market Cap US$m	13,152	25,064	27,220	49,360	75,495	65,748	62,910	69,153
	Val Traded US$m	694	1,677	4,147	13,502	26,276	21,929	29,417	10,754
	% GDP Traded	1.4	2.9	7.0	20.6	34.9	24.7	32.4	11.8
	T'Over Ratio	6.4	8.8	15.9	35.3	42.1	31.1	45.7	16.3
	Port Invest US$m	8	597	60	-295	-80	-109	-17	110
NIG	No. Companies	200	207	214	202	212	213	214	215
	Market Cap US$m	9,494	14,464	19,356	32,819	86,347	49,803	33,325	50,883
	Val Traded US$m	858	1,666	1,937	3,559	16,774	19,949	4,575	5,279
	% GDP Traded	1.3	1.9	1.7	2.4	10.1	9.6	2.7	2.6
	T'Over Ratio	11.3	13.9	11.5	13.6	28.2	29.3	11.0	12.5
	Port Invest US$m	183	178	-488	1,288	800	-3,403	-345	2,596
SAF	No. Companies	426	403	388	401	422	379	363	360
	Market Cap US$m	267,745	455,536	565,408	715,025	833,548	491,282	704,822	1,012,538
	Val Traded US$m	102,808	162,832	200,718	312,439	425,747	401,493	342,502	340,025
	% GDP Traded	61.1	74.3	81.2	119.7	148.8	145.8	121.1	93.4
	T'Over Ratio	45.5	45.0	39.3	48.8	55.0	60.6	57.3	39.6
	Port Invest US$m	723	6,359	4,807	19,627	10,242	-14,303	11,622	9,773
TUN	No. Companies	46	44	46	48	50	49	52	56
	Market Cap US$m	2,464	2,641	2,876	4,446	5,355	6,374	9,120	10,682
	Val Traded US$m	164	226	455	522	652	1,494	1,257	1,700
	% GDP Traded	0.6	0.7	1.4	1.5	1.7	3.3	2.9	3.8
	T'Over Ratio	7.1	8.9	16.5	14.3	13.3	25.5	16.2	17.2
	Port Invest US$m	14	24	12	65	30	-39	-89	-26
UK	No. Companies	2,311	2,486	2,759	2,913	2,588	2,584	2,179	2,056
	Market Cap US$m	2,460,064	2,815,928	3,058,182	3,794,310	3,858,505	1,851,954	2,796,444	3,107,038
	Val Traded US$m	2,211,533	3,707,191	4,167,020	4,242,082	10,324,477	6,486,959	3,402,496	3,006,680
	% GDP Traded	118.9	168.4	182.7	173.5	367.0	246.1	156.7	132.9
	T'Over Ratio	102.3	140.5	141.9	123.8	269.8	227.2	146.4	101.9
	Port Invest US$m	114,365	-81,154	-36,376	25,999	256,130	588,925	38,333	-2,161

The table details various stock market indicators for ten African emerging markets and the UK over the period 1996 – 2010. No. Companies refers to the number of domestic listed companies, while Market Cap details the total market value of all listed companies based on the company's share price multiplied by the number of shares in issue. The Value Traded and % GDP Traded refer to the total value of shares traded during the period and the value of shares traded as a percentage of the markets GDP, respectively. The turnover ratio is the total value of shares traded divided by the average market capitalisation and Port Invest refers to the net amount invested in equity and debt securities. Source: World Bank Databank and Datastream.

However, by 2010, several of the smaller markets, such as Morocco and Nigeria, had increased to a similar size of Egypt with market capitalisations of $69.1 and $50.9 billion, respectively. In 1996, the UK had a stock market capitalisation of $1.74 trillion; this grew to $3.11 trillion, in 2010. The gulf in size between the UK market, along with South Africa, and the remaining African markets is evident throughout all the stock market performance indicators examined.

Further analysis of Table 2.2 reveals four additional findings regarding stock market development in Africa. First, compared to the UK, African stock markets have experienced a higher level of growth over the 1996 to 2010 period. For example, UK growth in terms of stock market capitalisation increased 78.54 percent. By contrast, the lowest level of stock market capitalisation growth amongst the African markets was in Ghana, which increased from $1.49 billion in 1996 to $3.53 billion in 2010, an increase of 137 percent. The highest level of stock market capitalisation growth was achieved by Nigeria (1,329 percent) and Botswana (1,150 percent), which increased from $3.56 and $0.32 billion in 1996 to $50.88 and $4.08 billion in 2010, respectively. Furthermore, the table reveals that the level of growth within several African stock markets was relatively resilient to various periods of global economic crisis. During such periods certain African markets continued to record positive levels of growth in stock market capitalisation and, with the exception of the Asian crisis in 1997, the majority continued to outperform that of the UK. More specifically, during the Asian crisis (1997 to 1999), Kenya, Ghana, Nigeria and Mauritius recorded decreases in market capitalisation, with respective declines of 22.75, 19.52, 19.36 and 1.38 percent. Notably, during this period, the UK recorded the third largest increase in stock market capitalisation of 46.94 percent, behind Botswana (71.34 percent) and Egypt (57.65 percent). However, during the Dot Com crisis, (2000 to 2002), the UK experienced negative growth

in stock market capitalisation of 27.66 percent, which represented the greatest decline amongst the markets investigated. By comparison, only the African stock markets of Tunisia (-24.65 percent), Morocco (-21.18 percent), South Africa (-9.92 percent) and Egypt (-9.21 percent) experienced negative levels of stock market growth during this period; Botswana recorded the largest increase of 76.18 percent, followed by Ghana, which increased by 47.37 percent.

Similar findings are also apparent for the 2007 global crisis. During 2007 to 2009, only Tunisia and Ghana experienced increases in stock market capitalisation of 70.31 and 5.35 percent, respectively. By contrast, all other African markets recorded decreases in stock market capitalisation; the largest decline of 61.41 percent was in Nigeria. Notwithstanding this, growth in African stock markets has recovered. During 2010, only Egypt (-8.29 percent), Botswana (-4.72 percent) and Morocco (9.92 percent) failed to achieve greater levels of growth. The best performing stock markets during this period were Nigeria, South Africa, Ghana, Mauritius and Kenya, with respective increases in stock market capitalisation of 52.69, 43.66, 40.84, 37.26 and 34.45 percent.

Second, the importance of the African stock markets has increased over the sample period. In particular, market capitalisation as a percentage of GDP increased over the period considered in all African countries. For example, this figure increased by 304 percent in Botswana from 6.79 percent in 1996 to 27.43 percent in 2010. The smallest increase of 10.81 percent was recorded by Tunisia moving from 21.76 percent of GDP in 1996 to 24.12 percent in 2010. In addition, the value of stocks traded in US$ also increased by a factor of at least three for each of the African markets. The greatest increase was experienced by Nigeria; the value traded increased by 7,232 percent from $72 million in 1996 to $5.28 billion in 2010. The smallest increase in value traded was in Botswana, which recorded an increase of 352 percent from $31 million in 1996 to $140 million in 2010. Furthermore, with the exception

of Botswana and Mauritius, all African markets in the sample increased their value traded at a greater rate than that of the UK over the period 1996 to 2010. Despite this increase, the value of stocks traded as a percentage of GDP remained small compared to that of the UK. With the exception of South Africa, Egypt and Morocco, the value traded as a percentage of GDP remained less than 5 percent. By contrast, the value traded as a percentage of GDP in the UK was 132.90 percent. However, although the ratios are small for many of the African markets, they have increased by more than 100 percent in all markets except Botswana, which increased by only 50 percent over the period. For example, the value of stocks traded as a percentage of GDP in Nigeria was only 0.2 percent in 1996 but increased by 1,200 percent to 2.6 percent in 2010.

Third, liquidity in many of the African markets improved during 1996 to 2010. Using the turnover ratio as a measure of liquidity, Table 2.2 shows that, with the exception of Botswana and Ivory Coast, all African markets experienced improvements in liquidity over the period. The two largest African markets (Egypt and South Africa) had the largest turnover ratios in 2010 of 43.0 and 39.6 percent, respectively. While the other African markets in the sample lag behind Egypt and South Africa, it is apparent that some of the smaller markets such as Tunisia, Morocco and Nigeria have experienced improvements in stock market liquidity with turnover ratios of 17.2, 16.3 and 12.5 percent, representing increases from the 1996 level of 149, 176 and 381 percent respectively. It is also evident from the table that the global financial crisis of 2007 had a negative effect on liquidity. For example, in 2010, Kenya, Morocco and Nigeria recorded liquidity ratios that were nearly half the values achieved between 2006 and 2008.

Table 2.3: General Stock Market Information for Ten African Emerging Markets

Market	Main Exchange	Date Est	Tax Rates	Investment Ceiling for Listed Stocks		Investment Regulations for Entering and Exiting Markets					
						Entry/Exit Regulations End-2000			Entry/Exit Regulations End-2012		
				End-2000	End-2012	Market Entry*	Market Exit**		Market Entry*	Market Exit**	
							Repatriation of Income	Repatriation of Capital		Repatriation of Income	Repatriation of Capital
BOT	Botswana Stock Exchange	1989	7.5% withholding tax on dividends and 10% on interest	55% for Institutional Investment/ 10% for Private Investment	100% in General	Free	Free	Free	Free	Free	Free
EGY	The Egyptian Exchange	1883	Not applicable on capital gains	100% in General	100% in General	Free	Free	Free	Free	Free	Free
GHA	Ghana Stock Exchange		8% withholding tax on dividends; 0% tax on capital gains	74 % in General	74 % in General, 10 % for single entity	Free	Free	Free	Free	Free	Free
IVC	Bourse Regionale des Valeurs Mobilieres	1998	10% withholding tax on dividends	100% in General	100% in General	Free	Free	Free	Free	Free	Free
KEN	Nairobi Stock Exchange	1954	Dividend withholding taxes a 5%(domestic investors), 10% (foreign investors). Withholding tax on interest income 15%	40% in General	40% in General	Relatively Free	Free	Free	Free	Free	Free

The table shows stock market information for the ten African stock markets included in the sample. Specifically, the table details the main stock exchange in each market along with the date the exchange was established and any tax rates on investments. The table also details any changes in the investment ceiling for listed stocks and market entry and exit regulations over 2000 to 2012. Source: Standard & Poor's (2012) and African Securities Exchange Association (2009).

* Market Entry: Free - No Significant Restrictions to Purchasing Stocks; Relatively Free - Some registration procedures required to ensure repatriation rights, or significant limits on foreign ownership ** Market Exit: Free - Repatriation done routinely.

Table 2.3 Continued: General Stock Market Information for Ten African Emerging Markets

Market	Main Exchange	Date Est	Tax Rates	Investment Ceiling for Listed Stocks		Investment Regulations for Entering and Exiting Markets					
						Entry/Exit Regulations End-2000			Entry/Exit Regulations End-2012		
				End-2000	End-2012	Market Entry*	Market Exit**		Market Entry*	Market Exit**	
							Repatriation of Income	Repatriation of Capital		Repatriation of Income	Repatriation of Capital
MAU	The Stock Exchange of Mauritius	1989	---	100% in General / 15% for Sugar Companies	100% in General / Financial services commission approval required for holdings exceeding 15% of a Sugar Companies	Relatively Free	Free	Free	Free	Free	Free
MOR	The Casablanca Stock Exchange	1929	---	100% in General	100% in General	Free	Free	Free	Free	Free	Free
NIG	The Nigerian Stock Exchange	1977	0% on capital gains and capital market transactions	100% in General	100% in General	Relatively Free	Free	Free	Free	Free	Free
SAF	Johannesburg Stock Exchange	1887	Non-residents exempt from tax on dividends, South African sourced interest and VAT. Taxes applicable to non-residents include; Security Transfer tax of 0.25% post settlement, tax on royalty payments of 12% and withholding tax of 15% to entertainers and sports persons.	100% in General	100% in General	Free	Free	Free	Free	Free	Free
TUN	Bourse de Tunis	1969	Bonds – 20% withholding tax Capital gains for short term investments (-2yr)	49.9% in General	50% in General; anything over requires authorisation from superior investment council. Authorisation also needed for retail sector investment	Free	Free	Free	Free	Free	Free

The table shows stock market information for the ten African stock markets included in the sample. Specifically, the table details the main stock exchange in each market along with the date the exchange was established and any tax rates on investments. The table also details any changes in the investment ceiling for listed stocks and market entry and exit regulations over 2000 to 2012. Source: Standard & Poor's (2012) and African Securities Exchange Association (2009).

* Market Entry: Free - No Significant Restrictions to Purchasing Stocks; Relatively Free - Some registration procedures required to ensure repatriation rights, or significant limits on foreign ownership ** Market Exit: Free - Repatriation done routinely.

Finally, over the period examined many of the African markets recorded significant increases in the levels of net portfolio investment, suggesting that they are becoming a more attractive option for global investors. For example, in 1996 the net level of portfolio investment into Nigeria was -$173 million. However, by 2010, this figure had increased to $2.60 billion. Similar patterns are also found for South Africa and Botswana, where the levels of portfolio investment increased from $2.44 billion and -$7 million in 1996 to $9.70 billion and $415 million in 2010, respectively. Further examination of the figures reveals that the levels of portfolio investment have fluctuated over time. For example, between 2007 and 2008 the levels of portfolio investment in South Africa decreased from $10.24 billion to -$14.30 billion, before increasing again to $11.62 billion during 2009. This particular period, which spans the global financial crisis, resulted in negative values of portfolio investment among many of the African markets. Specifically, during 2008, with the exception of Botswana, all African markets recorded negative levels of portfolio investment. However, during 2010, many of the markets which recorded negative values over the preceding periods, such as Egypt, Morocco, Nigeria and South Africa, all showed positive levels of portfolio investment.

Table 2.3 presents an overview of the various African markets examined and provides details on the various market restrictions placed upon investors during the period 2000 to 2012. An examination of the table reveals vast improvements within many of the regulations surrounding the markets over this period. For example, at the end of 2000, the Botswana stock exchange had investment ceilings of 55 percent for institutional investors and 10 percent for private investment, both of which had been removed by the end of 2012. In addition, there were improvements in the investment ceilings for both the Stock Exchange of Mauritius and the Bourse de Tunis. In particular, at the end of 2000, there was an investment ceiling of 15 percent for sugar company investment in Mauritius and 49.9 percent for all

companies listed on the Bourse de Tunis. At the end of 2012 it was possible to exceed this level of investment in both cases. In Mauritius, permission to exceed the 15 percent limit can now be obtained through the financial services commission and authorisation can now be obtained through the superior investment council in Tunisia to exceed the 50 percent investment ceiling. Furthermore, there have also been significant improvements in market entry regulations in many of the African exchanges. For example, at the end of 2009 in order to ensure repatriation rights, there were various registration procedures required to enter the Nairobi Stock Exchange in Kenya, the Stock Exchange of Mauritius and the Nigerian Stock Exchange. All of these registration procedures have now been removed, making it easier for investors to gain entry to the markets.

2.5 Conclusion

The purpose of this chapter has been to provide a background to the economic and financial climate in African emerging markets and their prospects for UK investors. In doing so the chapter has examined the various challenges which have hampered development in many African countries; provided an overview of the various economic and financial market developments that have taken place in Africa; and assessed the future opportunities that exist for potential investors in the continent. The chapter also provided an overview of the economic and stock market performance of the ten African countries examined in this thesis during 1996 – 2010. The chapter highlighted four key findings.

First, despite recent attempts to reduce Africa's marginalisation from the rest of the world and the establishment of Regional Economic Communities (REC), progress has been slow. In particular, the chapter noted that multi-regional membership, a lack of intra-regional trade and corporate advocacy are some of the issues hampering economic development. Furthermore, as many of the countries in Africa have small stock exchanges, illiquidity is a

problem and the nationalistic desires of African countries has reduced the extent of capital market integration. In addition, many problems exist within the local environment, including small inefficient financial systems; lack of access to the banking sector, with high interest rate spreads and difficult account set-up procedures; poor judicial systems; conflicts and corruption; and a lack basic infrastructure within the continent. However, there is cause for optimism. Growth rates within the region, both with respect to economic and stock market performance have been impressive. African wide GDP increased by 4.9 percent each year during 2000 – 2008 and many of the regions stock markets have been among the top performing markets in the world since 1995. During 2014 the level of foreign investment (both direct and portfolio) is expected to reach a record high of $84.3 billion. Furthermore, many recent political reforms and initiatives have helped improve the economic environment. These include the removal of many monopolistic single party regimes and increasing efforts to improve basic infrastructure and accessibility within the continent, including increased trade ties with the likes of China, which is heavily committed to improving infrastructure in sub-Saharan Africa. In addition, the increase in the number of organisations, such as the Kimberly Process and the World Gold Council, have all helped reduce the level of conflict and corruption within the region, in particular those caused through the exploitation of the continents natural resources.

Second, the ten African markets included in this thesis have all recorded significant economic improvements during 1996 to 2010. For example, growth in terms of GDP increased dramatically in all African markets; the largest increase was in Nigeria, which increased by 474 percent and the lowest in Ivory Coast increasing 89 percent. By contrast, GDP in the UK increased by 85 percent. There were also improvements in other areas of the economic environment. Despite a weakening of the exchange rates between the African markets and the UK from 1996 to 2004, there was evidence to suggest that in the second half

of the sample period they had stabilised, remaining at similar levels to that of 2005. Many African countries also reduced inflation and improved trade levels. Net inflows of FDI also increased in many countries. However, it is also evident that the 2007 global crisis had a large impact on African FDI and trade, suggesting that as these economies have grown, they have become more susceptible to changes in global conditions.

Third, there have been substantial improvements in stock markets over the period. In terms of stock market capitalisation, the highest growth was achieved by Nigeria, which increased some 1,329 percent, while the lowest was Ghana, increasing by 137 percent. The growth of the various stock markets was also reflected by an increase in liquidity. Similarly, the value traded, both in real terms and as a percent of GDP, increased during 1996 – 2010, demonstrating an increasing importance of the stock markets within the economy. Furthermore, the African markets have made significant improvements in the regulations of the stock markets and removed restrictions to allow foreign investors easier access to the capital markets.

Finally, the African markets examined have performed very well over the various different crisis periods examined. For example, during 2007 – 2010 all African markets recorded higher growth rates in GDP compared with the UK.

Overall, the chapter has noted that there has been progress towards unification both within the various REC's and across the continent as a whole. Furthermore, the good performance of the African countries, both with respect to economic and stock market growth, suggests that this particular group of African markets may provide UK investors with excellent opportunities for investment.

Chapter Three

Literature Review

3.1 Introduction

The last two decades have seen a significant increase in the volume of both foreign direct and foreign portfolio investment into emerging economies (Fifield et al., 2006). Within the finance literature emerging stock markets have been shown to offer investors substantially higher returns and lower risk compared to more developed stock markets (Speidell and Sappenfield, 1992; Hartmann and Khambata, 1993; Harvey, 1994, 1995a, b; Fifield et al., 1999; Middleton et al., 2008). Specifically, it has been highlighted that emerging markets not only display higher rates of economic and stock market growth than that of more developed markets, but the return correlations between emerging markets and with developed markets are relatively lower compared to those found between developed markets (Errunza, 1994; Meric et al., 2001; Alagidede, 2009). Building on this suggestion a substantial amount of literature has established empirically that including a portion of emerging markets in a global portfolio can reduce overall portfolio risk as well as increase return (Errunza, 1994; Meric et al., 2001; Hassan et al., 2003; Driessen and Laeven, 2007).

African markets represent a new investment channel for investors and prior to 1989 there were only three stock markets operating in North Africa and five in Sub-Saharan Africa. This has resulted in many of the African markets being overlooked within the present literature compared to that of other emerging markets. This lack of attention within academia is a consequence of the nature of the African stock markets themselves, such as the relatively recent establishment of stock exchanges in several African countries coupled with the unavailability of detailed stock market data, making time series analysis very difficult. As indicated in Chapter 2, recent times have seen many improvements in the economic and investment climate of many African countries. As of 2012 there were 23 stock markets across Africa with a combined capitalisation of $1.5 trillion. The current theme of ‘Africa Rising’, promoting Africa as the landscape of the

future has increased awareness of the potential that these markets have to offer both businesses and global investors. Furthermore, African markets have recovered from the effects of the 2007 global crisis and the levels of foreign investment are expected to reach $84.3 billion during 2014, with portfolio investment predicted to reach $24.1 billion. It is expected that if these trends continue foreign direct and portfolio investment will become the main source of financial flows into the continent (Blas, 2014). These recent improvements, coupled with the current positivity surrounding growth and investment opportunities in the continent, suggests that the current lack of research needs to be redressed.

Within the literature there are many studies focusing on; (i) the ability to accurately forecast returns in order to fully benefit from the gains available from emerging stock market investment (Bekaert et al., 2007; DeMiguel et al., 2009; Ferreira and Santa-Clara, 2011); (ii) the short- and long-run relationships between emerging markets (Gilmore and MacManus, 2002; Chen et al., 2002; Piesse and Hearn, 2002; Neaime, 2005; Graham et al., 2012); and (iii) the barriers and risks of investing in emerging markets (Chuhan, 1994; Bekaert, 1995; Tornell and Westerman, 2005; Kaminsky and Schmukler, 2008). This chapter reviews this literature in order to provide: (i) a background to the topic of emerging stock market investment in general and African emerging stock markets in particular; and (ii) a framework within which the results of the empirical analysis conducted in this thesis can be evaluated.

The remainder of this chapter is organised as follows. Section 3.2 outlines the various definitions of an emerging stock market that have been adopted by academics and practitioners. Section 3.3 presents an overview of the history of investment in emerging markets. The key elements of portfolio theory are explained in Section 3.4, while Section 3.5 introduces the concept of portfolio diversification. The academic literature that has investigated the potential gains available from investing in emerging stock markets is

reviewed in Section 3.6, while Section 3.7 explores the literature surrounding short- and long-run relationships between stock markets. Section 3.8 provides an overview of the literature investigating the predictability of returns in emerging stock markets. In Section 3.9 the barriers to, and risks associated with investments in emerging stock markets are discussed, while Section 3.10 reviews the literature relating to African stock markets. Finally, Section 3.11 offers a number of concluding observations.

3.2 Definition of an 'Emerging Market'

The term 'emerging market' has gradually replaced previously employed terms such as 'newly industrialising countries' or 'less developed countries' to signify a nation's (relatively poor) economic status. This category of economy is gradually becoming an important part of the world's financial markets, growing in both size and importance. Indeed, in a recent report, the asset management company, the Goldman Sachs Group, noted that they were now adopting the term 'growth markets' to describe these dynamic economies[39] (O'Neill et al., 2011). However, no universally accepted definition of what actually constitutes an 'emerging stock market' has yet emerged (Arnold and Quelch, 1998). Within academic literature there have been several attempts to formalise the term 'emerging stock market'. One of the earliest attempts was made by Errunza (1983), who argued that the term 'emerging stock market' covers three general types of financial market. The first of these categories includes the older more established markets, which span the past century.[40] Errunza pointed out that these markets did not historically play a large role in the creation of equity investment, but governments from within these markets had begun to take steps to promote the development of their domestic capital markets. The second category of 'emerging stock market' Errunza discussed were those

[39] O'Neill et al. (2011) defined 'growth markets' as emerging markets that contribute at least one percent towards global GDP. Specifically, they identified eight emerging markets which fall into this category: Brazil, Russia, India, China, Mexico, Korea, Turkey and Indonesia.

[40] Errunza gave examples such as Chile, Argentina, India, Greece and Spain as markets which fall into this first category of 'emerging market'.

that owed their development to particular circumstances, such as Hong Kong and Singapore, which had emerged as a result of developments in the Far East and acted as regional financial centres. The final category that Errunza suggested relates to emerging stock markets that had been developed with the purpose of promoting economic growth; these include the Philippines and Korea.

While this type of categorisation of 'emerging stock market' is useful in highlighting classes of market that may be deemed emerging, the specifics of what actually constitutes an emerging market are still unclear. One proposed definition that has met with relatively wide acceptance, in particular among academics, is that proposed by the IFC. This organisation adopts the criteria of the World Bank in order to categorise a market as developing; specifically they define the term 'developing country' to be one that has low to middle income. Based on 2013 data, 'low' income countries were defined as those with a Gross National Income (GNI) per capita[41] of $1,045 or less, whilst countries with a GNI per capita of between $1,046 and $4,125 were classified as 'lower middle' income and countries with a GNI per capita of between $4,126 and $12,746 were termed as 'upper middle' income (The World Bank, 2014a).[42] This form of categorisation covers many of the world's markets and in fact those classified as emerging may differ markedly in terms of size and stock market liquidity. In particular, in 2014 the IFC classification grouped markets such as Brazil, India and South Africa as emerging (The World Bank, 2014a). However, in 2012 their stock market capitalisations of $1.23tn, $1.26tn and $635bn, respectively, exceeded that of several small developed European markets including Austria ($106bn), Belgium ($300bn), Finland ($158bn) and Portugal ($65bn) (The World Bank, 2014b). Furthermore, during 2012, India (with 5191

[41]GNI measures the total value of goods and services produced within a country, also taking into account any payments made or received from other countries within a given year. GNI *per capita* takes into account the number of people living in the country and therefore provides a basis of comparison between countries (Parkin et al., 2014).

[42] The criteria which determines whether a country is developing is not fixed and countries are able to slip in and out of the developing group.

companies) had the largest number of domestically listed companies in the world, followed by the US with 4102 (The World Bank 2014b).

While the definition provided by the IFC is generally accepted among academics, practitioners have tended to adopt a different view of what constitutes an 'emerging market'. Arnold and Quelch (1998) focussed on particular aspects of a country's economy and market fundamentals such as growth, market capitalisation and development of the free market system. The authors argued that from an investor's perspective, there are three specific aspects of a country's economy that should influence any characterisation as emerging. First, the authors pointed to the absolute level of economic development, as measured by GDP *per capita*.[43] They cited this measure as the most frequently used in the determination of an emerging stock market, followed by that suggested by the World Bank. The second aspect is the pace of a country's economic development, as measured by GDP growth.[44] In particular, they defined this categorisation as those economies that have enjoyed GDP growth rates of between five and ten percent. Third, Arnold and Quelch pointed to the stability of the free market system within an economy, in particular the level of market governance. Although it is noted that this aspect of a market is much harder to measure than the first two, Arnold and Quelch argued that investors can use tools such as national investment risk indices to assess this type of economic information. In order to emphasise the long-term market potential within emerging markets, Arnold and Quelch adopted a broad definition of emerging markets which included all three of the above criteria.

[43] GDP refers to the total market value of all goods and services produced within a country in a given year. GDP *per capita* takes into account the number of people living in the country and therefore provides a basis of comparison between countries (Parkin et al., 2014).

[44] Problems associated with other classifications of emerging markets are that the actual growth rates are below the expectations of potential investors. Arnold and Quelch (1998) highlight Russia in the early 1990s as an example of such a market. While other emerging markets achieved growth rates of between five and ten percent, the Russian economy was actually shrinking, making it less attractive to investors.

Overall there is much debate as to what specifically defines an emerging stock market, with different stances being taken by both academics and practitioners. In general the term is accepted to refer to a market that is either increasing in size, level of sophistication or in some form of transitional period (Standard and Poor's, 2005; Arnold and Quelch, 1998).

3.3 Emerging Market Investment

The concept of global investing is not a new idea and dates as far back as the financing of Columbus's voyages with the setting up of the limited partnership of Spanish investors by Queen Isabella. Within the UK one of the first examples of international investment dates back to 1868 with the formation of the Foreign & Colonial Investment Trust for the purpose of investment into the railroad companies in the US (Fifield, 1999). While the term 'emerging market' was only established in 1981, with the setting up of the first emerging markets database by the IFC,[45] the concepts of emerging or 'less developed' markets, as they were previously termed, is far from new. In fact as highlighted by Chernow (1990), many states within the US could have been classified as emerging during the recession in the 1840s, as a result of defaulting on their debt.[46] Furthermore, despite the establishment of the first emerging markets database in 1981 along with one of the first country funds for emerging markets in Korea during 1984 (The World Bank, 1996), emerging market investment declined during the 1980s. Many of the markets classed as emerging were closed off to foreign investors due to restrictions on foreign ownership and underdeveloped capital markets. Coupled with the Latin American debt crisis of the mid-1980s, very few investments from overseas were channelled into emerging markets during this period (Bekaert and Harvey, 2003).

[45] The database consisted of eight countries with data that went back to 1975 and one country with data going back to 1977 (Bekaert and Harvey, 2003).

[46] Chernow (1990) argued that states such as Arkansas, Indiana, Michigan, Mississippi and Pennsylvania could be classed as emerging, due to debt defaults in the 1840's.

However, during the early part of the 1990's the situation improved. Many emerging markets underwent a process of financial liberalisation allowing foreign investors access to these new markets.[47] The process of liberalisation has been shown to have a significant impact on both stock market and economic growth in emerging markets (Bekaert et al., 2003; Bekaert and Harvey, 2003; Bekaert et al., 2005).[48] Examining the impact of equity market liberalisation across a wide range of emerging markets, Bekaert et al. (2003) showed that post-liberalisation the level of US holdings in domestic equities had increased from nearly nothing to between 25 to 50 percent of stock market capitalisation, suggesting an increase in the importance of foreign investors in emerging equity markets following liberalisation. This increased level of capital flows has resulted in significant growth of the stock markets in emerging economies. For example, in 1985 the stock market capitalisation of the Mexican equity market was only 0.7 percent of GDP. However by 2000, following financial liberalisation, this had risen to 21.8 percent of GDP (Bekaert and Harvey, 2003). This flow of new capital into emerging stock markets has resulted in much higher stock market growth compared with that of more developed stock markets. Barry et al. (1998) highlighted that during the period 1985 – 1995 emerging stock market capitalisation increased twelve fold from $167.7 billion to $1.9 trillion, while the comparable developed stock market capitalisation increased only 3.5 times. During 2005 to 2009 the emerging markets share in the total number of equity deals more than doubled from 12 percent to 30 percent, with their share of overall deal size increasing from eight percent to 21 percent during the same period (Meerkatt and Liechtenstein, 2010). In addition to improvements in equity markets, the levels of economic growth within emerging markets has been far superior compared to that of more developed

[47] The process of liberalisation reduces the barriers in place that restrict foreign investors from entering a particular market. This process would generally be coupled with advances in capital markets and trade reforms. Levine and Zervos (1996) pointed out that the purpose of financial market liberalisation is to increase the amount of foreign direct and foreign portfolio investment.

[48] Bekaert et al. (2005) argued that equity market liberalisation results in a one percent increase in the rate of real economic growth.

markets.[49] For example, over the period 2000 to 2009 the gap in GDP growth between emerging and developed markets increased to 4.45 percentage points compared with only 1.63 percentage points in the previous decade (Meerkatt and Liechtenstein, 2010). Several recent reports have also highlighted the potential of emerging markets to continue this rapid growth over the next two decades and surpass that of even the largest developed markets. By 2025 it is estimated that the major emerging economies of Brazil, China, India, Indonesia, South Korea and Russia will account for more than half of all global growth (Global Development Horizons, 2011). Further to this the BRIC markets (Brazil, Russia, India and China) have been forecast to collectively be larger than the US as early as 2050. Indeed, as of 2010, China had surpassed Japan to become the second largest economy in the world, several years earlier than predicted (O'Neill et al., 2011).

3.4 Portfolio Diversification

Investors wishing to create a portfolio of securities can use diversification as a tool to minimise the amount of risk. This risk reduction is achieved through the investor holding a range of different securities, resulting in any losses occurring within one security being offset by a gain in another. This idea underpins modern portfolio theory which was pioneered by Markowitz (1952) and Tobin (1958). Specifically, modern portfolio theory established the mean-variance framework of portfolio diversification in a domestic context. Within the mean-variance framework the risk of an overall portfolio depends on the return correlations between the individual securities within the portfolio.

[49]Despite the impressive rates of growth within emerging markets there have also been significant periods of instability. In particular, the Mexican Peso crisis of 1994, the 1997 Asian crisis, the 1998 Russian Rouble devaluation and the 2001 Argentinean economic crisis. In recent years, the economies of developing countries have recovered. For example, the GDP of developing countries increased by five per cent over the period 2001 – 2005 while the corresponding figure for developed markets was less than one per cent (Standard & Poor's, 2005). This impressive growth in GDP within emerging markets continued through until 2009, reaching a historical high of eight percent (Naude, 2009). Despite being impacted by the 2007 global crisis, emerging market growth has again improved, reaching 5.2 percent in the second half of 2013, compared to only 1.9 percent within the US (IMF, 2014)

The mean-variance framework was pioneered by Markowitz (1952). Markowitz (1952) classified portfolio selection as a two stage overlapping process. The first stage begins with the investor's experience and observations of securities within the market, while the second stage concerns the investor's belief about the future performance of securities and ends with the selection of a portfolio. It is this second stage which is the focus of Markowitz's work. His work outlined what has become an accepted rule, that investors should not consider the expected return from securities as the only important factor, but s/he should also consider the variance (risk).[50] In particular, Markowitz showed that the mean portfolio return could be calculated according to the formula:

$$R_p = \sum_{i=1}^{N} X_i R_i \qquad [3.1]$$

where R_p is the return on the portfolio, X_i is the proportion of the portfolio invested in share i, and R_i is the return on share i. Similarly, the standard deviation of a portfolio return can be calculated as:

$$S_p = \sqrt{\left(\sum_{j=1}^{N} X^2_j \, \sigma^2_j + \sum_{j=1}^{N} \sum_{\substack{k=1 \\ k \neq j}}^{N} X_j X_k \, \sigma_{jk}\right)} \qquad [3.2]$$

Where S_p is the standard deviation of the portfolio, X_j and X_k is the proportion of the portfolio invested in share j and k, respectively, σ^2_j is the variance of share j, and σ_{jk} is the covariance between assets j and k.

[50]Markowitz's theory is based upon the assumption that investors are rational. The aim of a rational investor is to construct portfolios that will gain the highest possible return, whilst taking on the lowest possible risk. In fact investors who construct portfolios irrationally are ultimately doomed to lose wealth (Friedman, 1953; Figlewski, 1978).

Accepting the rule that investors should be concerned not just with expected return but also variance, Markowitz showed the importance of covariance in the calculation of portfolio risk. In particular, he showed that as the number of securities within a portfolio increases the number of covariance terms increases at a much greater rate, reaching the point where it is the covariance that determines the level of risk within a portfolio and the individual standard deviations of each security become negligible.[51] Furthermore, Markowitz highlighted that providing investors avoid investing in securities which have a high covariance among themselves (or perfect positive correlations), the variance of the portfolio will never increase. In fact the only case when the variance would not be reduced without lowering the return rate is if the assets are perfectly positively correlated.

Grubel (1968) made one of the first attempts to apply Markowitz theory to international stock markets. Analysing *ex-post* monthly returns from eleven major stock markets during January 1959 to December 1966, Grubel showed that investors are able to obtain higher rates of return or lower risk by creating an internationally diversified portfolio, as compared to a portfolio of Moody's industrial common stocks. In doing so a New York investor wishing to maintain the same level of risk (47.26 percent) would have been able to increase his/her overall portfolio return from 7.5 to 12.6 percent. However, more interestingly Grubel's results are dominated by the inclusion of several emerging markets such as South Africa, Japan and Australia. These markets had the lowest return correlations with the US and when removed from the sample resulted in the potential gains from diversification falling to 8.9 percent. Furthermore, when all three of the emerging markets were added to the portfolio, the level of risk was nearly always lower. This finding highlighted that the inclusion of emerging stock markets when investing internationally can not only increase portfolio returns, but also reduce overall

[51] This relationship is explained by Brealey and Myers (2006) who showed that: N (investments) = N (variance terms) and N [(N – 1)/2] (Covariance terms). This formula shows that, for a portfolio consisting of 100 securities, there will be 100 variance terms and 4,950 covariance terms.

portfolio risk. Further research into the benefits of international diversification was done by Solnik (1974). Solnik highlighted the different types of risk surrounding markets, specifically market (systematic) risk and unique (un-systematic) risk.[52] Solnik examined both, nationally and internationally, how much market risk remains after successful diversification has been achieved and how many stocks an investor would need to invest in, so as to only be left with un-diversifiable market risk. The findings within domestic markets suggested that unique risk is fully diversified after investing in a relatively small number of securities. The exact number of securities varied depending upon which market the investor was in, along with the level of market risk. For example, US levels of market risk were 27 percent, UK 34.5 percent and Germany 44.5 percent. However, when investing internationally market risk declined dramatically. Specifically, a well-diversified international portfolio was only half as risky as a well-diversified portfolio of US stocks, with the level of market risk reducing to only 11.7 percent. Furthermore, Solnik concluded that similar risk reduction benefits would be apparent if the testing was carried out on other markets. Many early studies have now documented the benefits of diversifying internationally. Grubel and Fadner (1971) showed that over the period 1965 to 1967 the industry correlations within countries exceeded those across countries, demonstrating greater diversification benefits from investing internationally. Other early work contributing to the benefits of international diversification include Levy and Sarnat (1970), Lessard (1973), Bergstrom (1975) and Johnson and Walther (1992).

3.5 Portfolio Diversification in Emerging Stock Markets

Within the finance literature it is well established that combining markets that have returns which are not perfectly correlated can reduce risk. The lower the level of return correlation between two markets the greater the benefits of risk reduction available

[52]Market risk refers to the risk inherent in specific markets which cannot be eliminated through diversification, whereas unique risk is the risk that investors can protect against and eliminate through diversification.

to investors. It is for this reason that emerging markets have become popular for investors seeking to reduce overall portfolio risk (Harvey, 1994; 1995b). Many studies have documented the low correlations that exist between emerging and developed markets (Errunza, 1994; Meric et al., 2001). Speidell and Sappenfield (1992) demonstrated this by combining a portfolio consisting of the S&P 500 index with the Europe, Australia and Far East (EAFE) index. Their results showed that when the proportion of S&P 500 in the portfolio was reduced from 100 to 90 percent, the return increased from 15.8 to 16.1 percent, while the standard deviation reduced from 17.1 to 16.8 percent. By increasing the level invested in the EAFE index from 10 to 20 percent, the expected return further increased to 16.4 percent and risk reduced to 16.7 percent. This finding is also backed up by Divecha et al. (1992) who noted that although these markets can be characterised as highly volatile and unstable, as a group they displayed much lower volatility than some individual markets. Their analysis also pointed out that adding 20 percent of an emerging market index to their portfolio during 1987 – 1992 would have increased portfolio return from 12.6 percent to 14.7 percent and reduced overall portfolio risk from 18.3 percent to 17.5 percent. Further testing on the effects of adding emerging markets to a portfolio of developed markets was conducted by Harvey (1995b).[53] The results not only showed that correlations between both emerging markets and with developed markets are very low and, in some cases negative, but also that the addition of emerging markets into a portfolio of developed markets dramatically reduced the level of portfolio risk. Specifically, the average return correlation for the cross-section of developed markets was 41.0 percent, while the average return and standard deviation was 13.9 and 14.4 percent, respectively. When the emerging markets were added to the group, the average correlation between the

[53]Testing was carried out during 1986 to 1992 by adding monthly returns from eighteen emerging markets taken from the IFC indices to eighteen monthly returns from developed markets taken from Morgan Stanley Capital International (MSCI) indices, and conducted when short selling was both allowed and constrained.

group of emerging and developed markets reduced to only 14.0 percent, while the standard deviation reduced to just 7.5 percent.

In recent times many of the world's markets have become more integrated, due to both advances in technology, communications and perhaps more importantly reductions in trade barriers and the opening up of many financial markets (Bekaert and Harvey, 2002). This integration has resulted in an increase in the return correlations between many of the developed markets, reducing the level of risk reduction available through diversification (Fifield, 1999; Bekaert and Harvey, 2000). For example Solnik et al. (1996) showed that over the period 1961 to 1994 the correlation between the US and UK increased on average by 1.38 percent per year or 47 percent over the whole period. Importantly, within the academic literature it has been highlighted that this trend of increased return correlations has not been the case between developed and emerging stock markets. In particular, Bekaert and Harvey (2000) noted that even after emerging market liberalisations the return correlations between the emerging and developed markets increased slightly but not significantly enough to impact the benefits of diversification. Similar findings have also been noted within the emerging stock markets of Africa. Providing an examination of ten African stock market indices with that of the S&P global index, Agyei-Ampomah (2011) pointed out that despite the liberalisation efforts within African markets many of the return correlations between the group were either negative or less than ten percent.

The use of diversification as a tool to minimise risk within a portfolio of securities is most important during times of global economic crisis, where stock markets are highly unstable and returns extremely volatile. Many articles have examined the impact of global crisis periods on return correlations. Using correlation analysis, Meric and Meric (1997) examined changes in correlation among twelve European equity markets and the US, pre- and post- the 1987 equity market crash. Their results revealed that 70 of the 78

correlation coefficients between the groups of markets increased post-market crash[54]. However, emerging market return correlations have been found to be relatively robust to the effects of global financial crises and events. Speidell and Sappenfield (1992) analysed return correlations during the 1987 market crash, and found that while correlations between developed markets and the US increased to 0.45, return correlations between several emerging markets and the US remained low at only 0.15. Errunza (1997) backed up this point with regards to the 1987 market crash, and also showed that emerging markets still offered investors diversification benefits during major market events such as the 1994 US monetary tightening, and emerging market specific events such as the 1994 Mexican crisis. Similar results were also found during the 1997 Asian crisis. For example, Forbes and Rigobon (2002) conducted an analysis of contagion surrounding the 1987 US market crash, the Mexican Peso crisis of 1994 and the 1997 Asian crisis. Although their findings indicated a degree of co-movement between the markets during the crisis periods, they concluded that there was no evidence of a material increase in correlation coefficients during any of the crisis periods. Despite this, the global crisis spanning 2007 to 2009 has been found to have a more severe impact on emerging market return correlations. Bartram and Bodnar (2009) showed that the return correlations between emerging market indices increased by 36 percent during the crisis, suggesting a reduction in the potential for diversification.

Other studies that have examined the impact of the 2007 global crisis have also found that there was a significant impact on emerging markets. For example, Dooley and Hutchinson (2009), analysed the responses of 14 emerging markets to types of news released by the US over 1/07 to 2/09. Their findings showed that until September 2008,

[54] Other studies that have documented similar findings include Solnik et al. (1996) (with regard to the 1987 market crash and other global events such as oil shocks); Schwebach et al. (2002) (indicated that the Asian financial crisis resulted in an increase in return correlations among developed markets); and Meric et al. (2008) (found that correlations between the US and several Asian markets increased significantly following the September 11 attacks in the US).

emerging markets were largely decoupled from the effects of the crisis. However the collapse of Lehman Brothers on the 15th September resulted in an adverse response from emerging markets to events in the US from that point forward. Furthermore they also indicated that from August 2008 share price volatility increased dramatically along with return correlations between the emerging markets and the US. Similar findings surrounding the impact of the 2007 global crisis on emerging stock markets have been noted by Samarakoon (2011). The general conclusion that emerged from this research was that the global crisis resulted in a significant decline in the returns within many emerging stock markets and an increase in return correlations. In general these results indicate that emerging stock markets were not immune to the impact of the global crisis and thus may not provide meaningful diversification for global investors during such periods.

3.6 The Benefits of Investing in Emerging Stock Markets

The potential gains available from including emerging stock markets as part of a well-diversified portfolio are now well documented in academic literature. The early work of Lessard (1973) indicated that significant gains are available for a US investor in four Latin American countries (Brazil, Argentina, Chile and Columbia) during the period 1958 - 1968. The results demonstrated that with the exception of Brazil, adding each of the markets to a well-diversified portfolio not only increased the expected returns available but also reduced overall portfolio risk. Other early studies on the benefits of adding emerging markets to an investment portfolio include Levy and Sarnat (1970) and Errunza (1977).[55] These findings are reinforced in several more recent studies such as Wilcox (1992b) who examined the returns and standard deviations in the IFC composite

[55]Errunza, (1977) assessed the gains from investing in emerging stock markets using data for (i) 29 countries over the 1957 – 1971 period; and (ii) 16 countries between 1958 – 1972. The results showed that, even after accounting for the problems and costs associated with investing in emerging stock markets, the argument for increased gains was strongly supported over the different time periods considered.

emerging market index compared to that of the US S&P 500 index. The annualised compound returns of the S&P 500 from 1986 – 1991 was 12.0 percent with a standard deviation of 18.8 percent as compared to the IFC emerging market database annualised compound return of 18.3 percent with a standard deviation of 28.2 percent. While it is clear that emerging market returns have higher standard deviations than more developed markets, it is worth noting that returns for individual emerging markets can reach well above 60 – 70 percent.

One of the first comprehensive analyses of emerging stock markets was carried out by Harvey (1994, 1995a,b) which included data for 20 emerging and 21 developed markets over the period 1976 – 1992. Harvey analysed the gains from investing in (i) developed markets; (ii) developed and emerging markets; and (iii) developed and emerging markets with a maximum weighting of 20 per cent allocated to emerging markets. Using two different investment strategies[56] the results showed that adding emerging markets to the portfolio not only increased the expected return but also resulted in lower standard deviations, for both the restricted and unrestricted portfolios. Other studies that provided similar findings are Wilcox (1992a), Divecha et al. (1992), Speidell and Sappenfield (1992), Errunza (1994) and Barry et al. (1998).[57] The superior stock market performance of emerging markets as compared to that of more developed markets is highlighted by Galagedera (2012). This study examined the risk-adjusted performance of 22 developed and 18 emerging stock markets over 2003 to 2010. Using data envelopment analysis[58] the results indicated that, with the exception of 2007, an emerging

[56] The first strategy was to create a minimum variance portfolio and the second was to mimic the volatility of the Morgan Stanley Capital International world market portfolio by creating a target volatility of 16 percent.

[57] Barry et al. (1998) found that, although emerging markets experienced lower compound rates of return than that of the US market, they still offered diversification benefits to US investors.

[58] Data envelopment analysis is a form of linear programming which is used to examine performance where there can be multiple input and output variables that can influence the overall result. Galagedera (2012) highlights its usefulness in examining the risk-adjusted performance of stock markets compared to more traditional measures of stock market performance, such as the Sharpe or Treynor ratios, due to the ability to examine multiple risk factors (input variables) and multiple return factors (output variables) simultaneously. Specifically, the measures of risk used within the analysis include standard deviation,

market was the best performing market every year.[59] Despite this, it was noted that the worst performing market in each year during 2004 to 2010 was also an emerging market.[60] In addition, the results revealed that during 2003 to 2010 ten of the developed markets (Australia, Austria, Belgium, Canada, Denmark, Ireland, Italy, New Zealand, the UK and the US) recorded a statistically significant decline in performance, while only two of the emerging markets (Hungary and Mexico) recorded similar significant declines. By contrast, only two developed (Israel and Japan) and two emerging (Indonesia and the Philippines) markets recorded a significant increase in performance. While these results clearly indicated the impact that the global crisis has had on the performance of many global equity markets, it is clear that DSMs have experienced a larger impact.

Assuming the perspective of a local investor Driessen and Laeven (2007) examined the potential for diversification across 52 countries, including 23 developed and 29 emerging markets, during the period 1985 to 2002. They estimated the benefits of regional and global diversification subject to short selling constraints, short-selling constraints in developing countries only and short selling constraints in all countries. Their results indicated for regional or global investment the potential for diversification is substantial. Specifically, on the basis of regional diversification the results indicated that Eastern European investors could achieve the most substantial gains from diversifying into countries within their own region, increasing the expected return by 0.3 percent per month even when constraints on short-selling were imposed. However the benefits of investing globally were shown to be more statistically significant compared to that of regional diversification for most countries, ranging from 0.0 to 3.3 percent per

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systematic risk and downside deviation, while the average excess return is used as the return factor. In addition, to evaluate performance relative to external factors in the markets GDP, stock market capitalisation, inflation and stock market liquidity are also included as output variables in the analysis.

[59] The best performing markets were Malaysia (2004, 2006 and 2008), Indonesia (2009), Thailand (2010), Hungary (2003) and Mexico (2005).

[60] The worst performing markets were China (2004), India (2005), Colombia (2006), South Africa (2007), Russia (2008), Poland (2009) and Hungary (2010).

month. It was noted that when the constraint of short-selling was imposed on all countries the potential for diversification was substantially reduced. In addition, they also examined cross-country differences in diversification potential using various country level indicators, such as trade to GDP, market capitalisation and a measure of country risk. Their findings suggested that countries with a higher level of country risk provided significantly greater benefits of diversification. Despite the positive findings surrounding the potential for diversification across all markets on a global basis, the results did reveal that the potential for diversification had decreased during the sample period. It was suggested that this was due to a reduction in country risk within many of the markets examined during the period, indicating that as emerging markets develop and become more integrated with the global system, the potential for diversification may be reduced.

Abraham et al. (2001) outlined a significant diversification potential for global investors wishing to diversify into the emerging markets of the Gulf region over the period 1993 to 1998. They highlighted that due to stability in Gulf exchange rates the currency risk factor for global investors within the region was considerably reduced. Several other studies have focused on regional specific diversification benefits. Bailey and Stultz (1990) showed increased benefits for diversification within Asian emerging stock markets while Islam and Rodriguez (1998) demonstrated similar findings within Latin American emerging markets. More recently Gilmore and McManus (2002) found no evidence of integration between the US and several Central and Eastern European (CEE) markets. Specifically they examined the relationships between the US, Czech, Hungarian and Polish equity markets and demonstrated an increased return and risk reduction for US investors in the region.

There has been a range of academic literature focusing on how investors should best achieve the gains available through diversification into emerging markets.[61] Many

[61] One aspect that differentiates emerging markets from that of more developed ones can be the constraints that are imposed on short-selling of stocks (Li et al., 2003). Many earlier studies do not account for

studies have differing views on the optimum proportion of the overall portfolio that should be allocated to emerging markets to fully achieve risk reduction benefits. For example, Speidell and Sappenfield (1992) argued that the optimal weighting for portfolio allocation in emerging markets should be between 10 – 15 percent. Other studies have indicated that this allocation is too low and further risk reduction can be achieved by increasing the allocation to 20 – 30 percent (Divecha et al., 1992; Abraham et al., 2001; Gilmore et al., 2005). Examining the optimum weightings over different time periods (1975 – 1995 and 1990 – 1995) Barry et al. (1998) showed that over longer periods the optimal weighting in emerging markets should be increased. They suggested that 30 percent of the overall portfolio should be allocated to emerging markets over longer time periods and 10 percent over shorter periods. Providing an analysis of the Middle East and African region, Hassan et al. (2003) suggested that the inclusion of up to 50 percent of emerging markets into the MSCI All-Country index would have resulted in an increase in annual return, while also reducing risk.

3.7 The Relationships between Markets

As previously highlighted the benefits of including emerging markets in an internationally diversified portfolio, depend on the low return correlations between the markets. However, it has been suggested that the use of correlation analysis when seeking to establish the benefits from international diversification is not without its problems. Several studies have highlighted that while an analysis of correlations can aid portfolio diversification over short-term horizons, the potential gains through the use of

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restrictions on short selling within emerging markets, which is particular popular among many newly developed derivatives markets. Li et al. (2003) analysed the benefits of diversification among a group of developed (Canada, France, Germany, Italy, Japan, the UK and the US) and emerging markets (Hong Kong, South Korea, Singapore and Thailand). Their results showed that the benefits of diversification for a US investor do not persist after short-sale constraints are imposed over the developed market group. However, between the US and the emerging markets the benefits after imposing short-sale constraints remain substantial, suggesting that the gains through diversification in emerging markets are robust to the short selling constraint.

correlations may be overstated over longer-term horizons (Gilmore and MacManus, 2002). In particular, it has been noted that if the markets being analysed have a tendency to trend or move together over the longer term, the result could be that the potential gains from international diversification are misleading (Kasa, 1992). In recent years there has been a significant increase in the number of academic papers focusing on the long- and short-term linkages between stock markets.[62] In doing so many studies have employed cointegration techniques in order to analyse the long-run co-movements between many of the world's emerging and developed markets and their implications for portfolio diversification.

One early study examining the relationships between international stock markets was Eun and Shim (1989) who used a nine-market vector autoregression (VAR) system to investigate the transmission of stock market movements.[63] Not surprisingly their results showed that the US, being the world's most developed market exerts significant influence, with innovations from the US rapidly transmitting to all other markets, suggesting that the potential for US investors wishing to diversify within these markets may be limited. In a similar study Chowdhury (1994) analysed the inter-relationship between the US, Japan and four smaller Asian markets, Hong Kong, Singapore, Korea and Taiwan. The findings again demonstrated the influence that the US has on other markets. However, it was also noted that between the Asian markets themselves, in particular Korea and Taiwan, only ten percent of the error variance could be explained by shocks from Hong Kong and Singapore. Chen et al. (2002) investigated the dynamic inter-dependencies between several Latin American stock markets (Argentina, Brazil, Chile, Columbia, Mexico and Venezuela) from 1995 – 2000. They found that the two

[62] Aside from the analysis of linkages between stock markets Masih and Masih (1997) cited advances towards globalisation such as enhancements in the flow of information, the reduction of transaction costs between markets, and the relaxation of controls, have all contributed, not just to an increase in international capital flows but have also spurred an interest in the analysis of market integration.

[63] Markets included in the study were the UK, US, Australia, Canada, France, Germany Switzerland, Japan and Hong Kong.

largest markets in terms of capitalisation, Brazil and Mexico, were the most important in explaining price movements in the other markets. Using cointegration analysis they indicated that the potential for diversification within these markets was limited. During the period 1995 – 1999 their investigation revealed one cointegrating vector between the Latin American markets. However, they also noted that during the final year and a half of their sample period, investing in Latin American markets could reduce portfolio risk. More recently, Graham et al. (2012) employed a three-dimensional coherency analysis to examine the level of integration between the US and 22 emerging stock markets during 2001 to 2010.[64] Grouping the various emerging stock markets by geographical region, the findings demonstrated that within emerging America, European and Asian markets, the US showed varying co-movements over the long-term. Over shorter-term horizons however the co-movement was less apparent. This finding suggested that for investors with longer-term horizons, the potential for diversification within the above mentioned regions was limited. Despite this, their analysis into the group of emerging markets within Africa indicated that Egypt and Morocco had very little integration with the US, suggesting both long- and short-term benefits of diversification were available. However, their results also showed that the level of integration between the US and other emerging markets was not consistent over time. In particular, they noted that post 2006, leading up to the global financial crisis, the co-movements between the US and emerging markets occurred at a higher frequency for time periods greater than one-year. This indicated that the crisis impacted the diversification benefits for US investors.

There have also been a number of studies examining the linkages between markets around times of global economic crisis. The focus has tended to be on how the levels of integration between stock markets are impacted by such events, and how quickly and how

[64] The study employed index level data for the 22 emerging markets which included Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand and Turkey.

severe shocks in one market are absorbed by others. Arshanpalli and Doukas (1993) examined several developed markets, including the US, UK, France, Germany and Japan, pre and post the 1987 market crash.[65] They used Ordinary Least Squares (OLS) regression an estimation of the error-correction model to establish the effects of the market crash on the cointegration and long-run dynamics between the markets. Their findings suggested that prior to the market crash, none of the markets showed cointegration with the US, whereas during the post-crash period only the Japanese market remained un-cointegrated with that of the US. This result indicated that in the period following the market crash, US investors would not have benefitted from creating an internationally diversified portfolio in the UK, France or Germany. Furthermore, the error-correction model revealed that the US held a short-run influence over all the European markets in the sample.[66] Similar findings were highlighted by Arshanpalli et al. (1995), who examined the impact of the 1987 market crash on the US and several Asian markets. Their findings revealed that the relationships between the markets strengthened in the post-crash period.

Meric et al. (2008) conducted an analysis of the co-movements between the UK, US and six major Asian stock markets before and after the September 11 2001 attacks.[67] Using principal component analysis[68], they found that pre-September 11, US and Russian investors could achieve substantial diversification benefits from investing in the Japanese or South Korean markets. In addition, similar findings were also apparent in the Indian stock market for all investors, excluding those in Russia. In contrast, post-September 11,

[65] Their testing used daily closing prices for the main indices in all five markets over the period January 1980 - May 1990. In order to analyse the effects of the market crash their data was split into two sub-periods, pre-crash (January 1980 – September 1987) and post-crash (November 1987 – May 1990).
[66] The F-values significant at the 5 percent level were 136.04, 39.20 and 5.47 for France, Germany and the UK respectively.
[67] They use weekly index data for the US, UK, Australia, China, India, Japan, South Korea and Russia. Their data is separated into two five year periods; pre-September 11(09/09/1996 – 03/09/2001) and post-September 11 (17/09/2001 – 11/09/2006)
[68] Principal component analysis is a multivariate technique used to determine the contemporaneous changes in co-movement patterns between markets.

the correlations between the UK, US and Asian markets increased, suggesting a reduction in the benefits for diversification. Despite this, their findings showed that the Russian market continued to offer diversification potential for investors in China, India and the US. Furthermore, the Granger causality results showed that the Indian stock market was not influenced by other markets post-September 11, suggesting that it could continue to offer the potential for diversification.

3.8 The Achievability of Gains within Emerging Stock Markets

The evidence thus far clearly indicates that gains from including emerging markets in a well-diversified global portfolio can be substantial. However, several practical implications may lead to an overstatement of the gains from diversification in emerging markets. For instance, it has been documented that the standard mean-variance framework may not be appropriate when examining emerging markets due to non-normality of returns. In particular, Bekaert et al. (1998) argued that returns in emerging stock markets are characterised by significant skewness and kurtosis. Their study examined the normality of returns in 20 emerging markets during April 1987 to March 1997. They showed that 17 and 19 of the 20 suffered from positive skewness and excess kurtosis, respectively, and over half rejected normality at the 95 percent level of confidence. Another example can be seen with Li and Ross (2009) who showed that returns and standard deviations did not follow a normal distribution in the Peruvian stock market during August 2007.[69] There is much debate on the importance of non-normality of returns when constructing portfolios. While some evidence suggests that aspects of non-normality, such as excess kurtosis, are only applicable to individual stocks (DeFusco

[69]Specifically, they noted that the mean return was 1.618 percent while the standard deviation of return - 1.081 percent. Under the assumption of the normal distribution, the return should not immediately move by more than three standard deviations (99.73 percent) from the mean, in this case 5.94 percent. However, it actually fell by 8.46 percent, clearly showing that the mean returns do not follow the normal distribution.

et al., 1996), others show it is a factor that persists and cannot be ignored (Sun and Yan, 2003; You and Daigler, 2010).

Another implication surrounding emerging stock market investment, is the nature of the *ex-post* mean-variance testing, which utilises historical returns along with variance and covariance data. Jorion (1985) highlighted two problems with the standard *ex-post* mean-variance framework. One issue was the construction of the optimum portfolio under the mean-variance framework. The study noted that weightings allocated to each asset were sensitive to changes in expected return. Perhaps most importantly, Jorion highlighted the fact that while *ex-post* testing revealed substantial gains, the measures rarely persisted beyond the testing period. These factors could result in an overstatement of the gains through an *ex-post* mean variance framework approach. Jorion suggested the use of the Bayes-Stein estimation approach[70] as a solution to the out-of-sample problems and found that the performance of the optimal portfolio improved significantly. Other early studies such as Logue, (1982) and Madura and Abernathy (1985), attempted to overcome this *ex-post* problem using an *ex-ante* framework. The general conclusions emerging from this line of testing are that very few gains documented in the *ex-post* analyses are attainable when relying on historical data to identify *ex-ante* optimal emerging market portfolios.[71] More recently Fifield et al. (2002) provided a comprehensive analysis on the *ex-ante* performance of 17 emerging stock markets during 1991 to 1996. Using a moving average method to forecast returns, standard deviations and correlations, based on historical data during 1991 to 1993, the study identified *ex-ante* mean return per unit of risk (MRPUR) optimal portfolios during each single-year period from 1994 to 1996.[72] The resulting *ex-ante* portfolios were then compared to the

[70] The Bayes-Stein estimation approach shrinks past averages towards a common mean.
[71] Due to instability in returns, variances and covariance's between markets it was noted that the creation of an *ex-ante* strategy becomes extremely difficult when derived from *ex-post* data.
[72] In order to create the forecasts for the *ex-ante* data two methods were employed. First, an equally weighted moving average was conducted where the forecast data was created with equal emphasis on the

actual *ex-post* MRPUR-optimal portfolio during the corresponding period, to determine the level of gains actually achievable on an *ex-ante* basis. The results provided further support that very few of the gains achievable on an *ex-post* basis could be achieved by creating *ex-ante* portfolios based on historical data. Despite this, the results of the analysis also provided promising evidence that a greater proportion of the overall *ex-post* gains available could be achieved. Testing was also conducted where *ex-ante* forecasts were created for only the correlation matrix, using actual *ex-post* returns and standard deviations within the forecast. In this instance the forecasts achieved nearly all of the gains available within the corresponding *ex-post* optimal portfolios, suggesting that the key input to the portfolio problem is the ability to accurately forecast returns.

The problem surrounding the ability of forecasts to accurately predict out-of-sample portfolios has received much attention in academic literature. Indeed, there is evidence to suggest that stock returns do contain a predictive element (Campbell and Schiller, 1988; Bekaert et al., 2007; Hjalmarsson, 2010). Despite this, many sophisticated models employed to provide accurate out-of-sample forecasts for stock market returns have shown to be unsuccessful at achieving consistent performance. For example, DeMiguel et al. (2009) provided a comprehensive analysis of the out-of-sample performance for the sample-based-mean-variance portfolio rule, along with various extensions of the rule. In order to provide a benchmark for the performance of the out-of-sample portfolios, a naïve method diversification was also conducted.[73] In total 14 different portfolio models were examined. In each case the model failed to consistently outperform the naïve diversification method. Similar findings were noted by Gilmore et al. (2005) who examined the diversification benefits for US and German investors diversifying into the central European markets of Hungary, Poland and the Czech

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previous three one-year periods. Second, exponentially weighted moving averages were constructed where differing levels of emphasis were placed upon the more recent past.

[73] They defined the naïve diversification method as one which invests an equal amount in each of the assets available at the rebalancing date.

Republic. Using weekly data during 1995 to 2000 four different models including the certainty equivalence tangency portfolio, the minimum variance portfolio, the Bayes-Stein portfolio, and as a comparison the naïve method of diversification, they examined the out-of-sample performance during 2000 to 2003. Despite producing negative returns, the results indicated that for both US and German investors, the Central European markets produced better out-of-sample performance compared to that of the domestic markets. However, in the case of German investors, the naïve strategy remained the best, while for US investors only the Bayes-Stein method marginally outperformed that of the naïve. In response to the inability of many sophisticated extensions of the mean variance rule to consistently outperform that of the naïve method, Tu and Zhou (2010) investigated whether a combination of various sophisticated strategies with the naïve strategy, would produce a method of forecasting that could consistently outperform naïve diversification. Their results showed that the combined strategies performed better than there un-combined counterparts and in many cases significantly outperformed the naïve method of diversification.

Much attention has been given to the ability of various economic variables to provide an indication of future returns within stock markets. In particular, the use of economic variables such as dividend-price, earnings-price and book-to-market ratios (Fama and French, 1989; Campbell and Schiller, 1988; Ang and Bekaert, 2007; Ferreira and Santa-Clara, 2011), interest rates (Campbell, 1987; Rapach et al., 2005; Ang and Bekaert, 2007; Abugri, 2008) and inflation (Campbell and Vuolteenaho, 2004; Rapach et al., 2005), have been shown to provide some level of information regarding future stock returns. However, despite compelling evidence in the academic literature surrounding economic indicators as predictors of future stock returns, there is also evidence suggesting that the results from many studies may be overstated. Welch and Goyal (2008) conducted a comprehensive analysis including a wide range of economic variables during 1920 to

2005. Their results suggested that during 1976 to 2005, none of the economic variables were able to provide significant out-of-sample forecasting power compared to a simple forecast based on the historical average equity premium. In contrast, Ferreira and Santa-Clara (2011) conducted an alternative approach to predicting future stock returns using the sum-of-the-parts method. Stock market returns were decomposed into three separate forecast ratios including dividend-price, earnings-growth and price-earnings. By exploring the differences in the time series components in each forecast, their results showed that during 1927 to 2007, the out-of-sample performance of the methods produced significant gains for investors compared to both the historical mean and other predictive regressions.

Much of the evidence surrounding the use of economic variables as a predictor for future stock market returns has been presented from the perspective of a US investor. However, in emerging stock markets there have been several articles which provide promising results surrounding their predictability. Bekaert et al. (2007) is one such article which examined the impact of liquidity on expected returns across a wide selection of 19 emerging stock markets during 1987 to 2003.[74] Their findings suggested that local market liquidity was a significant driver of expected returns in emerging markets. Furthermore, using the International Country Risk Guide (ICRG) index for both law and order and political risk, they suggested that the use of liquidity as a predictor for future returns can play a much more important role in countries with higher levels of these risks. This finding indicated that for countries with poor law and order or high levels of political risk, improvements in liquidity can be a significant predictor of future stock returns. Similar findings were noted by Tsouma (2009) who examined the differences between a group of

[74] The zero return measure of liquidity is calculated by the number zero return trading days over the total number of trading days in a given period. Bekaert et al. (2007) highlighted this method for measuring liquidity as beneficial for examining emerging stock markets as it accounts for the impact that high transaction costs have on daily returns. In particular, in markets with higher transaction costs there will be more instances of daily zero return.

22 mature and 19 emerging markets surrounding the ability of economic activity to explain future stock returns. Examining the period 1991 to 2006, the results showed that industrial production and the consumer price index provided significant information regarding future stock returns in many of the emerging markets.

Providing an examination into return predictability in ten European emerging stock markets, Smith (2009) provided evidence that returns in smaller, less efficient stock markets can be predictable.[75] The results revealed that the relatively small and illiquid stock markets of Malta, the Slovak Republic and Slovenia reject the assumption of following a martingale model. Similar to the test for the random walk hypothesis, the results indicated that the returns in these markets could be predictable. It was suggested that as stock markets increased in size, quality and became more liquid they would become more efficient and less predictable.

3.9 Barriers to, and Risks of, Investing in Emerging Stock Markets

Within emerging stock markets there are many unique risks which can prevent investors accessing potential gains and also discourage the flow of global capital. Barry et al. (1998) pointed out that nearly 100 percent of the capitalisation in many emerging stock markets is made up of only a handful of large companies and in some cases, such as Argentina, concentrated in a small number of sectors. This concentration restricts the degree of diversification that investors can achieve and affects the composition of emerging market indices. It is also well known that emerging markets are categorised by excessive trading costs, which in many cases can provide a large stumbling block for investors wishing to gain access to them. If the gains from diversification are examined without accounting for trading costs there is a risk they may be significantly overstated (Diwan et al., 1993).

[75] The markets included in the analysis are Czech Republic, Estonia, Hungary, Malta, Poland, Russia, the Slovak Republic, Slovenia, Turkey and the Ukraine, during 1998 to 2007.

Bekaert (1995) identified three categories of emerging market barriers/risks which could discourage international investors. The first category of risk related to legal barriers arising through aspects such as ownership restrictions, capital controls, minimum investment requirements and withholding taxes.[76] Second, Bekaert categorised barriers inherent within many aspects of cross country investing, such as differences in accounting systems and informational disclosure requirements. The third type of barrier to investment was highlighted as emerging-market specific risks such as currency risk, political risk, liquidity risk and macro-economic instability.

In recent times many emerging markets have undergone a liberalisation process to encourage foreign participation in their capital markets.[77] This process of liberalisation has reduced many of the barriers historically in place within emerging markets, resulting in a reduction in importance of the first two barriers identified by Bekaert (1995). However, the effects of the liberalisation process have resulted in further debate among academics, with many arguing that the process itself leads to enhanced risks of boom-bust cycles (Allen and Gale, 1999; Tornell and Westerman, 2005; Kaminsky and Schmukler, 2008).[78] Others have argued that this risk is overstated. Bekaert and Harvey (2003) found that liberalisation actually resulted in an increase in the capitalisation of the Mexican equity market.[79] Similarly Bekaert et al. (2005) showed that not only did

[76]Barry and Lockwood, (1995), highlighted Chile as an example of minimum investment requirements, where at the time of the study investments into the market must be held for a minimum period of one year.
[77] Between the mid-1980s to mid-1990s Bekaert et al. (2003) identified 30 emerging markets that underwent some form of liberalisation process in order to encourage foreign investment into the markets. As an example of this liberalisation process in African markets, Bekaert et al. (2003) highlighted a number of countries that lifted restrictions on foreign investment to their capital markets, including Morocco (1988), Egypt (1992), Kenya (1995), Nigeria (1995), Tunisia (1995) and South Africa (1996).
[78] Allen and Gale (1999) highlighted Japan during the 1980s as an example of financial liberalisation leading to stock market booms and ultimately collapse. Specifically they discussed that liberalisation during the 1980s resulted in increasing asset prices, with the Nikkei 225 index rising from 10,000 in 1985 to 36,916 by December 1989. Following the implementation of tighter monetary policy they highlighted that by October 1990 it had dropped to only 20,222 and was followed by a real estate collapse during the following year. In addition, they discussed Mexico during the 1990s, where a process of financial liberalisation lead to an increase in bank credit to private enterprise from 10 percent of GDP in the late 1980s to 40 percent in 1994. Coupled with a sharp increase in the stock market during the same period, which ultimately lead to the Mexican Peso crisis of 1994.
[79] In particular, they noted that prior to financial market liberalisation the capitalisation of Mexico's equity market was only 0.7 percent of GDP. Post liberalisation the capitalisation rose to 21.8 percent of GDP.

liberalisation lead to a decline in volatility but also increased annual economic growth by a percentage point. More recently, Kaminsky and Schmukler (2008) argued that the process of liberalisation actually leads to a combination of both arguments presented so far, with large booms and busts occurring in the short-term followed by long-run stabilisation of capital markets.

Within the third category covering emerging-market-specific risks, there have been several identified as being more important. Fifield (1999) highlighted that the most important of these are political risk, information problems, currency risk, share price volatility and liquidity risk. It appears however that many of these risks are improving or at least evolving over time. For example, Fifield (1999) pointed to a report from the *Economist* in 1995 that showed the information levels available to investors in emerging markets were rapidly catching up with that of more developed markets. Although volatility within emerging markets has been found to be a significant factor for investors (Chuhan, 1994), others have suggested that the volatility in emerging markets has fallen (Richards, 1996). Despite this, political risk is still found to be a major stumbling block for investors in emerging markets, dramatically reducing the returns available (Helliar et al., 1996; Lensink et al., 2000). Bilson et al. (2002) investigated the relationship between political risk and stock market returns for a sample of 17 emerging and 18 developed markets during the period 1985 to 1997.[80] Their findings showed that with the exception of only Taiwan, which had a lower average level of political risk than Hong Kong, all remaining emerging markets examined had greater levels of political risk compared with all remaining developed markets. Furthermore, consistent with earlier findings such as

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Furthermore, the Mexican equity market became accessible to investors through various channels as opposed to a single Mexico fund prior to liberalisation.

[80] The emerging markets included six Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico and Venezuela), seven Asian countries (India, Korea, Malaysia, Pakistan, Philippines, Taiwan and Thailand), one European country (Greece), one Middle Eastern country (Jordan) and two African countries (Nigeria and Zimbabwe). The 18 developed markets were examined only for comparative purposes and included (Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, the UK and the US).

Diamonte et al. (1996),[81] their findings indicated that political risk among certain emerging stock markets had a significant impact on the level of stock market returns. In particular, the impact of political risk on stock market returns was shown to be statistically significant for Pacific Basin emerging markets including Korea, Malaysia, Philippines, Thailand and Singapore, indicating that stock market returns increase as political risk decreases. In addition, the results also showed that the significance of political risk on emerging stock market returns became more apparent during the second half of the sample period 1992 to 1997; a pooled regression for all emerging markets revealed a statistically significant relationship between stock market returns and levels of political risk, which was not the case during the earlier years 1985 to 1991.

Although there are many risks surrounding emerging markets, one major concern highlighted by investors is liquidity risk (Middleton et al., 2007). Stock markets may only be open several days a week and may have fewer trading hours on the days that they are open; many of the shares in emerging stock markets may be very thinly traded, meaning that investors may struggle to liquidate their investments even if the markets are open. Within African stock markets this point was highlighted by Appiah-Kusi and Menyah (2003) who revealed that while many of the markets were open five days a week, the trading hours in some markets were only two hours a day, with the most extreme case being the Ivory Coast where the stock exchange only traded for 30 minutes a day.[82] Furthermore, they also pointed out that in only two of the markets examined, Egypt and Morocco, did the turnover ratio, a measure of liquidity in the stock market, exceed ten percent. It has also been highlighted that the concentration of capitalisation within

[81] For example, Diamonte et al. (1996) examined political risk in 21 developed and 24 emerging markets. Their conclusion highlighted three points regarding emerging markets and political risk. First, emerging markets contain significantly more political risk than that of developed markets. Second, the additional political risk has an undesirable impact on portfolio returns. Third, and more positively was that a reduction in political risk had a positive impact on returns, which was greater than the same level of reduction in political risk in more developed markets.

[82] The markets included were Botswana, Egypt, Ghana, Kenya, Ivory Coast, Mauritius, Morocco, Nigeria, South Africa, Swaziland and Zimbabwe.

emerging stock markets can create very misleading indicators of liquidity, in particular when measured using the turnover ratio (Barry and Rodriguez, 1998).[83] They indicated that in markets where a few securities make up a large proportion of the total capitalisation, investors with substantial funds in their portfolios would be restricted to holding only a few securities, and therefore not able to achieve benefits of diversification. Examining the performance of various Latin American stock markets compared to the US market, they noted that although the majority of Latin American emerging markets produced low turnover ratios, during 1995 the turnover ratio in Brazil was 53.6 percent, not far behind that of the US with 86.0 percent.[84] Despite this, it was noted that the Brazilian stock market was highly concentrated, with the largest ten companies holding over 40 percent of the total market capitalisation. It has also been suggested that the substantial gains available from emerging market investment could be significantly reduced by illiquidity (Lesmond, 2005). Many studies have examined the effects that liquidity can have on share returns,[85] and conclusions from these studies indicated that securities correlated to liquidity display higher returns. Jun et al. (2003) provided an analysis of 27 emerging equity markets during 1992 to 1999. Using three measures of liquidity including, turnover ratio, trading volume and turnover-volatility, which takes turnover over standard deviation, the results showed that stock returns in emerging markets are positively correlated with all three measures of liquidity. However, examining the time series behaviour of liquidity across the emerging market groups their results also indicated that liquidity in certain emerging stock markets was improving.[86]

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[83] The turnover ratio can be used as a measure of liquidity within a market and is calculated as yearly average market capitalisation divided by total yearly market turnover. The difference in size of emerging stock market capitalisation and concentration compared to that of more developed markets can create a misleading indicator of a market's liquidity.

[84] During 1995 other Latin American stock markets including Argentina, Chile, Columbia and Venezuela were shown to have very low levels of turnover ratio of 15 percent or below.

[85] For models which show the link between liquidity and expected returns, the reader is referred to Constantinides (1986), O'Hara (2003), Eisfeldt (2004) and Bekaert et al. (2007).

[86] In particular, their results showed a statistically significant improvement in liquidity across the period in the markets of Brazil, Greece, Hungary, India, Nigeria, Pakistan, Portugal, South Africa, Taiwan, Turkey and Zimbabwe.

More recently, Lam and Tam. (2011) found similar results in the Hong Kong stock market. Including 769 companies during the period 1981 to 2004 and using nine different measures for liquidity, their results showed that liquidity is an important factor in the Hong Kong stock market at pricing returns. It was revealed that liquidity factors based on turnover ratio, trading volume, standard deviation of turnover ratio and trading volume produced the most consistent results at pricing returns.

3.10 African Emerging Markets

The literature thus far has presented varied arguments for and against investment into emerging markets. However, African stock markets have received far less attention from practitioners and academics compared to that of other emerging markets. Despite this lack of attention by investors in African stock markets, compared with other emerging markets, there is evidence to suggest that the benefits through investment into the region could be substantial.

It was highlighted in Chapter 2 of this thesis that in recent times African markets have undergone significant developments in order to improve their economic environments and to encourage the flow of foreign direct and portfolio investments. Several studies have examined the impact that stock market development and increases in the levels of portfolio investment can have upon economic development in African markets. Adjasi and Biekpe (2006) examined the impact of stock market development on economic growth in 14 African markets. They assessed the impact of various stock market indicators on the level of economic growth, including stock market capitalisation to GDP, value of shares traded to GDP and turnover ratio. The markets included were categorised by income level (GDP per capita) and stock market size (capitalisation) to examine the impact on economic growth between countries at differing stages of

development.[87] The findings indicated that improvements in the stock market can have a significant impact of economic growth. In particular, it was noted that improvements in the total value of shares traded can boost economic growth by up to 3.7 percent. However, for the smaller markets the finding was less apparent. When splitting up the markets by income and capitalisation, the most significant improvements in economic growth were for countries with upper-middle income (Botswana, Mauritius and South Africa) or moderate sized stock markets (Mauritius and South Africa), suggesting that the remaining stock markets were too insignificant to play a role in boosting economic growth. These findings indicated that African markets should seek to increase activity in their capital markets to spur economic growth. These findings were supported by Enisan and Olufisayo (2009). Examining the long-run relationship between stock market development and economic growth, their findings indicated that only between the two larger markets of Egypt and South Africa, did a relationship exist; indicating that stock market development significantly impacts economic growth. However, in several of the smaller countries including Ivory Coast, Kenya, Morocco and Zimbabwe, there was evidence of Granger causality between stock market and economic growth. This suggested that improvements and higher demand in their capital markets would be beneficial for economic growth.

Several studies have found evidence to suggest that African stock markets can provide a promising potential for global investors. Many African markets have been included as part of a wider analysis into the potential of the Middle East North Africa (MENA) region. Lagoard-Segot and Lucey. (2007) examined capital market integration and its implications for diversification. Their analysis included various countries in

[87] The countries categorised as low income countries were Ghana, Kenya, Nigeria, Zambia and Zimbabwe; low-middle income were Egypt, Ivory Coast, Morocco, Namibia, Swaziland and Tunisia; upper-middle countries were Botswana, Mauritius and South Africa. For the categorisation based on stock market capitalisation, only South Africa and Mauritius were classed as moderately capitalised stock markets, while the remaining were all classed small.

MENA, together with benchmark indices for the European Monetary Union (EMU), the MENA and the MSCI World Free Index. Specifically, they included the markets of Egypt, Israel, Jordan, Lebanon, Morocco, Tunisia, and Turkey, during the period January 1998 to November 2004. Using cointegration analysis they found no long-run relationships between the MENA emerging markets and any of the benchmark indices employed. These findings suggested international and regional investors could benefit through portfolio diversification within any of the markets examined. In addition, using an event-based study they also examined the pre- and post-impact of various financial, economic and political events on the level of integration between the MENA countries and the benchmark indices.[88] Their findings indicated mixed reactions to the various events examined and that the markets should not be viewed as a single group for portfolio allocation purposes. Furthermore, by adjusting the integration scores in the event study, based on stock market capitalisation, they concluded that the most favourable markets for diversification were Israel and Turkey, followed by Egypt, Jordan and Morocco. In contrast to these findings Cheng et al. (2010) examined stock market behaviour in the MENA region using variations of the Capital Asset Pricing Model (CAPM), during 1997 to 2008. Their results clearly showed that the majority of stock markets were segmented from the global market and provided a promising opportunity for global investors. In addition, it was indicated that the markets of Israel and Turkey were highly integrated with the global financial markets, casting doubt on their ability to offer investors the potential for diversification. It was however noted that for several of the markets, including Egypt, there was a significant positive risk-return trade-off, indicating that investors into the region are rewarded for excess levels of risk.

[88] Specifically, they examined the impact of the creation of the EMU, the 2000 to 2001 Turkish crisis, the EuroMed and Agadir free-trade agreements, the implementation of various infrastructure privatisation programs, the World Trade Centre attacks and the invasion of Iraq.

Using Johansen cointegration techniques Neaime (2005) conducted an analysis of the MENA region[89] to establish the long-run relationships between the markets, and establish the potential for US, UK or French investors. Their findings suggested that the second group of markets, which included Egypt and Morocco, were not able to offer international investors the benefits of diversification, due to being cointegrated with the developed markets. In addition, testing was also carried out using Granger causality, examining the short-run dynamics between the markets. The findings showed that developed markets Granger causes all markets in the second group containing Egypt and Morocco. However, on a regional basis the long-run relationships were found to be weak - that is, regional investors could benefit from investing in this group of markets. Furthermore, between the two groups of MENA countries it was also found that diversification benefits existed, where the GCC countries offered investors from the remaining MENA countries the opportunity to enhance their portfolios through investment.

With a specific focus on South Africa Lamba and Otchere (2001) used multivariate cointegration analysis to provide an examination of the linkages between South Africa and several developed markets. Specifically, they examined the long-run linkage between South African with the US, UK, Japan, Germany, France, Canada and Australia over the period May 1988 – May 2000. They split their data into two periods, May 1988 – December 1994 and August 1994 – May 2000, to allow an examination of pre- and post-Apartheid.[90] Their results indicated that prior to the Apartheid period there were no long-run relationships between South Africa and the developed markets. Furthermore, only Canada had any short-term causal effects upon South Africa. After

[89] The main developed financial markets used are the US, UK and France. The MENA region countries include Bahrain, Kuwait, Saudi Arabia, Jordan, Egypt, Morocco and Turkey. The data was split into two groups for testing, those within the Gulf Cooperation Council (GCC) (Bahrain, Kuwait, Saudi Arabia) and the second (Jordan, Egypt, Morocco and Turkey).

[90] The Apartheid period refers to South Africa's isolation from the worlds political and economic systems, which began to ease during 1989 – 1994.

the Apartheid period however the long-run relationships between South Africa and the developed markets had strengthened. For investors in the developed markets these findings clearly demonstrated a reduction in the diversification potential of the South African market post-Apartheid.

Despite this lack of support for global investment into South Africa, post-Apartheid, there is much evidence to suggest that other African markets provide a promising potential for diversification. Conducting an analysis on a group of four African stock markets, Alagidede, (2009) examined the extent to which South Africa, Egypt, Nigeria and Kenya were integrated with the global financial system during 1997 to 2006. In order to assess the level of integration three additional emerging markets Brazil, Mexico and India, together with several developed markets, namely the UK, US and Japan were included. Using Johansen cointegration the results showed that between the group of African markets only one cointegrating vector existed, suggesting that very little integration in the region. In addition, an examination on the level of African market integration with the other emerging and developed markets, revealed that with the exception of South Africa and Egypt, the two largest markets during the period, the African stock markets are largely segmented. Furthermore, by examining impulse response functions between each pair of markets, the results showed that there are very few interactions, with any response quickly dying out. While casting doubt on the success of regional integration efforts within Africa, it is suggested that African markets can offer international investors significant opportunities for diversification.

Similar findings were also noted by Agyei-Ampomah (2011) who provided an examination into the extent that African stock markets are influenced by global markets. The analysis included ten African stock markets and the S&P Global index during 1998 to 2007. Providing support for the findings of Alagidede (2009) the findings suggested that African markets are segmented from the global market. Coupled with the low level

of return correlations between African stock markets, it is revealed that the benefits of diversifying into the region for both global and local investors could be substantial.

There is also evidence to suggest that African stock markets can offer global investors the opportunity for diversification during times of global economic instability. Wang et al. (2003) conducted an analysis on long-run relationships and short-run causal effects, between the US and the five largest African markets during the Asian financial crisis of 1997 to 1999.[91] The study included South Africa, Egypt, Morocco, Nigeria and Zimbabwe. Their results showed that prior to the Asian financial crisis two cointegrating vectors existed, whereas during the post-crisis period there were no cointegrating vectors. This suggested that the long-run relationships between the markets were weakened as a result of the crisis, indicating an increase in the potential for diversification. An analysis of the impulse response functions revealed that the short-term influence between many of the markets also weakened as a result of the crisis. For example, prior to the crisis the Moroccan market was highly interactive with all other African markets and the US. However, in the post-crisis period this level of interaction was almost none existent, demonstrating that Morocco had actually become more independent following the crisis. These findings surrounding the Asian crisis period are supported by Collins and Biekpe (2003). Examining the level of contagion between eight African stock markets (Egypt, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa and Zimbabwe) with the World and Hong Kong market indices, they investigated the impact that the Asian crisis had on the level of return correlations between the markets. Their findings were similar to that of Wang et al. (2003), indicating that only the largest markets, South Africa and Egypt, showed evidence of contagion as a result of the crisis period. However, on a regional basis it was revealed that some of the stronger relationships existed between

[91] The study used daily closing prices over the period 1st January 1996 to 31st May 2002. The data was converted to weekly data in order to mitigate the serial autocorrelation problem, and was split into two sub-periods; January 1996 to June 1998 (pre-crisis); July 1999 to May 2002 (post-crisis).

African markets. For example, it was noted that the strongest relationship existed between South Africa and Botswana, Namibia and South Africa, and Botswana and Namibia; all part of the Southern African region.

Similar findings relating to regional diversification are noted by Piesse and Hearn (2002). Using both cointegration analysis and Granger causality they examined the relationships between three African markets in the South African Customs Union (Botswana, Namibia and South Africa). Their results revealed a cointegrating vector between South Africa and Namibia but there was no evidence of any long-term relationship between Namibia and Botswana or South Africa and Botswana, suggesting that investors within both South Africa and Namibia could benefit through investment into the stock market of Botswana. An examination of the short-term effects (Granger causality) between the markets revealed that despite the size of the South African stock market within the region, there was unidirectional causality between Namibia and South Africa. Several reasons are put forward for this linkage between Namibia and South Africa. First, they suggested that African emerging stock markets within the South African Customs Union could be impacted by a common component, which given the integrated system between the markets could have a spill over effect and thus impact the South African stock market. Second they noted that along with the two markets sharing a colonial history and the Namibian dollar being pegged to the South African Rand, the two stock exchanges also share an electronic trading system, which could have further integrated the equity markets. This finding could suggest that for investors into the African region, the benefits for diversification may be limited if the markets are contained within the same regional economic community.

In addition to the strands of research surround integration in African stock markets, there have been several pieces of research focusing on return predictability. Appiah-Kusi and Menyah (2003) provided an examination of 11 African markets during

the period 1990 to 1994.[92] Their results showed that five of the markets in the sample, Botswana, Ghana, Ivory Coast, Nigeria, South Africa and Swaziland, did not follow weak-form efficiency, suggesting that future prices in the stock markets could be predicted. Despite this, they indicated that the level of transaction costs during the period examined could be too high for investors to take advantage of the predictability in the markets. In contrast, a study by Alagidede and Panagiotidis (2009) found that weak-form efficiency existed in the main stock market indices of Egypt, Kenya, Morocco, Nigeria, South Africa, Tunisia and Zimbabwe during 1995 and 2004. Despite finding evidence that investors in Kenya, Morocco and Tunisia were rewarded for higher levels of risk, there was no evidence found that future prices could be predicted within the markets. However, in a more recent examination of African stock markets Alagidede (2011) again examined the level of return predictability in six of the largest stock markets in the region.[93] Despite finding evidence in support of the African stock market being weak form efficient in his earlier investigation, the results here indicated that returns within African stock markets are indeed predictable.

Despite mixed findings surrounding the potential for investors to predict returns in African stock markets, there is evidence to suggest that the level of returns available through diversifying into these markets can be substantial. Hassan et al. (2003) provided a comprehensive analysis of the returns available through investing in ten stock markets within the Middle East and Africa (MEFA) region during 1984 to 1999.[94] Their analysis of the markets was broken down into three sections. First, they investigated the impact of political, economic and financial shocks on the volatility of the returns within the markets. Surrounding the impact among African stock markets their results indicated that

[92] The markets included were Botswana, Egypt, Ghana, Kenya, Ivory Coast, Mauritius, Morocco, Nigeria, South Africa, Swaziland and Zimbabwe.
[93] In particular the markets examined were South Africa, Egypt, Nigeria, Kenya, Morocco and Tunisia.
[94] The African countries included within the investigation are Egypt, Kenya, Ivory Coast, Morocco, Nigeria, South Africa, Tunisia and Zimbabwe.

volatility of returns was impacted by changes in the economic environment in Ivory Coast, Nigeria and Tunisia; the financial system in Kenya, Nigeria, South Africa and Zimbabwe; the political system in Nigeria. They suggested that due to the illiquid nature of many African markets, positive or negative changes in the economic, political or financial environment can cause investors to quickly move in and out of the markets causing an increase in volatility. Second, they examined the importance in levels of political, economic and financial risk on return predictability in the markets. The impact of country risk (beta), as suggested by international asset pricing models, was compared with local country risk factors including political, economic and financial, in order to determine which is more useful at predicting future returns. It was suggested that local factors were more useful at predicting future returns in Kenya, Morocco, Tunisia and Zimbabwe. Following Harvey (1994) the final section of the analysis added the emerging markets to the MSCI All-Country World-Index to determine the ability of the markets to improve the performance. Splitting the MEFA countries into two groups based on risk profile, their results showed that for both groups the expected return of the portfolio increased and the risk reduced. Specifically, the inclusion of ten percent weighting in high risk group (Egypt, Kenya, Nigeria, Turkey and Zimbabwe) reduced the annual risk of the MSCI- All-Country index by 3.07 percent, while increasing the annual return by 12.55 percent. Furthermore, when adding the lower risk group (Ivory Coast, Jordan, Morocco, South Africa and Tunisia) to the index the results showed that increasing the investment up to a 50 percent inclusion of emerging markets increases annual return and reduced risk.

3.11 Conclusion

The purpose of this chapter has been to examine the extensive academic literature surrounding both emerging and African emerging stock markets. The chapter began by highlighting the various changing definitions of an ‘emerging stock market’, which have

been adopted by both practitioners and academics. The popularity of this type of investment, including the early forms, current trends and future prospects for emerging market investment were discussed. Despite many emerging markets being behind that of more developed markets, both with respect to economic and capital market size and development, there is much evidence to suggest that these markets are becoming a more integral part of the global economy. Growth in many emerging market economies has been substantial and the level of both foreign direct and portfolio investment flowing into these rapidly growing markets is increasing at a much faster rate compared to more developed markets. Throughout the chapter the main focus has been on the investment potential of emerging and African stock markets, along with the potential barriers to and risk associated with this type of investment. In this regard the chapter has highlighted several key findings regarding the potential for global investment in these markets.

First, it was highlighted that due to recent advances in globalisation, many of the world's mature stock markets have become more integrated. This has resulted in an increase of the return correlations between their stock markets, reducing their diversification potential for global investors. However, between emerging stock markets, and in particular between emerging and developed stock markets, the level of return correlations are low and in some cases negative, enhancing the opportunities for global investors seeking to add emerging markets to a well-diversified global portfolio (Harvey, 1995). Furthermore, the evidence suggested that despite increasing integration, levels of return correlations between developed and emerging markets remain low (Bekaert and Harvey, 2000).

Second, the literature examined has indicated that adding an element of emerging markets to a globally diversified portfolio can increase the level of return and reduce the overall level of risk. Despite mixed conclusions surrounding the studies examining the long- and short-run relationships between emerging and developed stock markets, it was

revealed that measuring the relationships between a group of markets can be useful to indicate their potential for diversification. In particular, finding no relationship between various markets indicates a potential for diversification. Perhaps more importantly the benefits of investing into emerging stock markets are shown to be relatively robust to certain periods of financial crisis, providing diversification benefits to global investors when most needed. Despite this, the recent global crisis during 2007 to 2009 has had a severe impact on both the returns and return correlations in many emerging stock markets, suggesting that they may not provide meaningful diversification during such periods.

Third, despite the potential for emerging markets to provide investors with significant gains, one issue highlighted within the academic literature surrounds the nature of *ex-post* testing. In particular, the use of *ex-post* data may overstate the levels of gains actually achievable by investors without perfect foresight.[95] However, evidence within the current literature has also indicated that stock market returns may contain a predictable element. Specifically, the use of various sophisticated methods of forecasting along with various economic variables such as liquidity have been successful at predicting future returns. This suggests that it may be possible for investors to construct successful portfolios in emerging stock markets that could result in significant gains in the markets.

Fourth, investment in emerging stock markets was shown to be fraught with difficulty. In particular, it was highlighted that there are a number of barriers to, and risks associated with emerging stock markets that may either inhibit, or prohibit, investment into the asset class. Although recent liberalisation processes within many emerging markets have helped to reduce many of these risks (Bekaert, 1995), there are still many risks associated with an investment in emerging stock markets. Many emerging markets

[95] Among stock markets an *ex-post* analysis refers to testing that has been conducted to establish the historic benefits of investing in various markets. One problem highlighted with this type of analysis is that due to the stock returns, variances and co-variances between investments changing over time, the composition of the *ex-post* optimal portfolio can vary across periods. Therefore without perfect foresight investors may struggle to obtain the full level of gains that are identified through an *ex-post* analysis (Fifield et al ., 2002).

have been shown to suffer from illiquidity as indicated by low turnover ratios coupled with a high concentration of stock market capitalisation among only a few companies.

Finally, the review of the literature specific to African stock markets has suggested that they provide a promising potential for global investors wishing to include countries from within the region in a well-diversified portfolio of global assets. In particular, evidence from within the literature suggested that the majority of the markets in Africa are segmented from the global market, indicating substantial diversification opportunities. Furthermore, there was also evidence to suggest that the returns in African markets are predictable. This suggests that unlike findings in other emerging market groups, the theoretical gains available in African stock markets may be rather more easily achievable in practice. It was also highlighted that during periods of global instability, African markets could continue to offer investors with the potential for diversification. Specifically, during the Asian crisis it was revealed that the relationships between African and developed markets actually weakened, indicating an improvement in the performance of these markets during this period of instability.

Due to the general lack of research within African markets and their promising future potential as outlined in several sections of this literature review, research on the possible gains from investment in these markets would seem particularly timely. Furthermore, within the research the majority of studies that have examined African stock markets have tended to focus on the relationships between the markets and their integration with the global market. There has been very little evidence surrounding the physical returns available in this group of markets over long time periods. This omission from literature would appear significant given the recent performance and developments within the region, and an investigation into the investment potential of African markets seems worthwhile.

Chapter Four

An Analysis of the Relationships Between African Emerging Stock Markets and the UK

4.1 Introduction

This chapter examines the extent of the inter-relationships between the UK and African emerging equity markets. Specifically, the chapter examines the relationship between the stock market indices of the UK and eight African markets over the period 02/01/1996 – 28/12/2010.[96] The purpose of this chapter is to determine the potential of these African stock markets to provide a UK investor with an avenue for diversification. In addition, the chapter analyses how these relationships have been affected by the three major global financial crises which have occurred during this period, namely the Asian financial crisis of 1997, the Dot Com crisis in 2000 and the global credit crisis of 2007. The investigation utilises the Johansen (1988) cointegration technique and Granger causality to determine both long-run relationships and short-run causal effects of global events across the markets.

Despite the recent increase in the volume of empirical research that examines developing market integration, Africa represents a region that has received relatively little in the way of meaningful attention. With many African markets undergoing significant economic development over the last decade, they represent a new avenue for investors wishing to create internationally diversified portfolios. Using both daily and weekly benchmark index prices and returns, the chapter investigates the long-run relationships and short-run causal effects between the UK and eight African markets, Botswana, Egypt, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia. This sample includes all

[96] Since the end of 2010 many countries across the MENA have been impacted by a series of anti-government protests termed the Arab Spring. In particular, the main countries affected by the wave of protests have been Tunisia, Egypt, Libya, Bahrain, Syria and Yemen (The Telegraph, 2011). In addition to the impact that the Arab Spring has had on economic growth, such as tourism and cross-border trade, the effects have also been felt across many of the countries stock markets. For example, in Egypt investor reaction to the eruption of protests caused an 18 percent decline in the Egyptian stock market index and resulted the exchange being closed for two months between January and March 2011 (BBC News, 2011b). Due to the impact that these events have had on many African stock markets the data in this thesis does not extend beyond the end of 2010. However, the Arab Spring provides an avenue for future research into the effects this period has had on both the relationships between the group of African stock markets and the level of returns available.

African markets for which data were available over the time period covered.[97] The results are presented on a UK currency basis (although local currency-based evidence is referred to for comparison purposes) and should therefore shed light on the potential for a UK investor wishing to create a well-diversified portfolio incorporating many of the less developed markets within Africa. The remainder of this chapter is structured as follows. Section 4.2 presents the data and descriptive statistics while Section 4.3 highlights the methods used in the analysis. Section 4.4 reports the empirical results and Section 4.5 concludes the chapter by discussing the main findings and their implications.

4.2 Data and Descriptive Statistics

The analysis uses data from Datastream covering both daily and weekly closing prices from 02/01/1996 – 28/12/2010 for the major benchmark indices of the eight African markets along with the FTSE All-share index for the UK. Due to a lack of disaggregated data and the small size of some of the African markets, the analysis is conducted at index level[98]. In total, data for eight African markets were available from Datastream; Botswana, Egypt, Kenya, Mauritius, Morocco, Nigeria, South Africa and Tunisia. Due to data restrictions within the African markets it was necessary in certain cases to use a mixture of forms, within Datastream, to obtain data for each market used. For example, in the cases of Egypt, Morocco and South Africa, data was taken from the Morgan Stanley Capital Benchmark while for Nigeria Standard & Poor's Benchmark index was used. The remaining African market index data was obtained using a local exchange index through Datastream. Table 4.1 details the various time periods employed in the study, along with a list of each market investigated and the total number of

[97] Although data were available from Datastream for Ghana and Ivory Coast it was only provided on a monthly basis until August 2008 and were not included in the cointegration analysis.

[98] The definition of an emerging stock market used within the analysis follows the criteria proposed by the World Bank, which is based on the countries income level. Each of the African markets are examined are categorised as emerging as their GNI per capita falls within the low to middle income category.

Table 4.1: Time Periods Examined for Cointegration Analysis and Granger Causality

Period	Date		Markets Included	Number of Observations
	Daily Periods	Weekly Periods		
Whole Period	02/01/1996 – 28/12/2010	02/01/1996 – 28/12/2010	UK,EGY,KEN,MAU,MOR,NIG,SAF	3911 (783)
Period 1 (Pre-Asian Crisis)	02/01/1996 – 30/06/1997	02/01/1996 – 24/06/1997	UK,EGY,KEN,MAU,MOR,NIG,SAF	390 (78)
Period 2 (Asian Crisis)	01/07/1997 – 31/12/1998	01/07/1997 – 29/12/1998	UK,EGY,KEN,MAU,MOR,NIG,SAF	393 (79)
Period 3 (Pre-Dot Com)	01/01/1999 – 10/03/2000	05/01/1999 – 07/03/2000	UK,EGY,KEN,MAU,MOR,NIG,SAF,TUN	311 (62)
Period 4 (Dot Com Crisis)	13/03/2000 – 09/10/2002	14/03/2000 – 15/10/2002	UK,EGY,KEN,MAU,MOR,NIG,SAF,TUN	673 (136)
Period 5 (Post Dot Com)	10/10/2002 – 09/03/2005	22/10/2002 – 08/03/2005	UK,BOT,EGY,KEN,MAU,MOR,NIG,SAF,TUN	630 (125)
Period 6 (Pre-Banking Crisis)	10/03/2005 – 08/08/2007	15/03/2005 – 31/07/2007	UK,BOT,EGY,KEN,MAU,MOR,NIG,SAF,TUN	630 (125)
Period 7 (Banking Crisis)	09/08/2007 – 28/12/2010	07/08/2007 – 28/12/2010	UK,BOT,EGY,KEN,MAU,MOR,NIG,SAF,TUN	884 (178)

This table details the choice of splits for the data based on each particular crisis period studied along with the dates and number of daily (weekly) observations in each period. The bracketed numbers refer to the weekly data. Due to availability of data it was only possible to include Tunisia from period three onwards and Botswana from period five onwards.

observations within each period.[99] During the 15 year sample period there were three major financial crises: the Asian Crisis, the Dot Com and, the global credit crisis. To determine the impact of these events on market stability and inter-relations the period was split into seven sub-periods, as set out in Table 4.1. Although the dates marking the beginning of the Asian Crisis and both the beginning and end of the Dot Com crisis are well documented,[100] there is no consensus regarding the date of the end of the Asian Crisis or the start of the credit crisis. In a detailed study of the Asian Financial Crisis Chakrabarti and Roll (2002) treat 31/12/1998 as representing the end of the Asian Crisis. Therefore, the second sub-period, which is identified to be the Asian financial crisis period, is defined as beginning on 01/07/1997 through until 31/12/1998. The Dot Com crisis period was identified as the period from 13/03/2000 to 09/10/2002; another global event occurred during this period, namely the September 11th attacks in the US, which impacted many stock markets around the world. Therefore, the Dot Com actually includes two major global events. The 2007 global crisis, began on the 9th August 2007 with the release of bad news from the French bank BNP Paribas, which resulted in a sharp rise in the cost of credit (BBC News, 2009). This chapter therefore adopts 09/08/2007 as the start of the global credit crisis.[101]

Table 4.2 details the descriptive statistics calculated for the Sterling converted daily and weekly return series for all nine markets over the whole period 1996 – 2010.[102] In particular, the mean (Mean), the standard deviation (StDev), minimum (Min), and maximum (Max) were calculated along with slightly less conventional descriptive

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[99] All of the market indices were obtained in their local currency and converted to UK pounds Sterling (£) (i) to allow for comparisons between the different markets; and (ii) to provide results from the perspective of a UK investor (exchange rates were WM Reuters spot rates obtained in Datastream). All the analysis reported in the chapter is conducted on this basis, but the equivalent results on a local currency basis are provided in Appendix 4.4 – 4.10.

[100] The Asian Crisis began on 2nd July 1997 with the devaluation of the Thailand Baht (King, 2001; Chakrabarti and Roll, 2002). The Dot Com bubble burst on the 11th March 2000 with the spiking of the Nasdaq index of leading technology shares and lasted until the 9th October 2002 (BBC News 2010).

[101] Although both the dates for the daily and weekly testing adopt the same justification for the start and end of each period, the actual start and end dates are slightly different within the weekly testing due to covering a seven day period.

[102] The descriptive statistics for each of the sub-periods examined are located in Appendix 4.1 (Table 4.1A)

Table 4.2: Descriptive Statistics for Currency Exchanged Market Index Returns Over the Whole Period 02/01/1996 – 28/12/2010

	EGY	KEN	MAU	MOR	NIG	SAF	UK
Mean	0.0005 (0.0026)	0.0000 (-0.0002)	0.0003 (0.0015)	0.0003 (0.0017)	0.0004 (0.0019)	0.0002 (0.0011)	0.0001 (0.0006)
StDev	0.0174 (0.0430)	0.0122 (0.0316)	0.0094 (0.0227)	0.0096 (0.0264)	0.0137 (0.0404)	0.0173 (0.0405)	0.0115 (0.0256)
Max	0.1044 (0.1538)	0.1491 (0.2240)	0.0732 (0.1109)	0.0616 (0.0859)	0.1038 (0.1778)	0.0810 (0.2167)	0.0881 (0.1669)
Min	-0.1864 (-0.2026)	-0.1197 (-0.1846)	-0.0783 (-0.1276)	-0.0814 (-0.1999)	-0.1028 (-0.2179)	-0.1443 (-0.2638)	-0.0871 (-0.1253)
Spread	0.2908 (0.3564)	0.2687 (0.4086)	0.1515 (0.2385)	0.1430 (0.2858)	0.2066 (0.3957)	0.2253 (0.4805)	0.1752 (0.2922)
Skew	-0.2654*** (-0.4557***)	0.0777*** (0.5480***)	-0.1457*** (0.0515***)	-0.2067*** (-0.6682***)	-0.1988*** (-0.3173***)	-0.5081*** (-0.7945***)	-0.2119*** (-0.3347***)
Kurt	9.6607*** (4.8211***)	18.4638*** (10.4327***)	10.8126*** (6.0902***)	8.4959*** (9.4564***)	8.2119*** (8.0587***)	7.8559*** (8.2054***)	9.4415*** (7.6032***)
Jarque-Bera	7273.77*** (135.12***)	38961.82*** (1839.21***)	9957.73*** (311.49***)	4948.72*** (1416.45***)	4451.18*** (846.93***)	4009.75*** (965.17***)	6789.15*** (705.01***)

Note: This table shows the descriptive statistics for daily and weekly UK Sterling converted market returns over the whole sample period 02/01/1996 to 28/12/2010. The weekly descriptive statistics are displayed in parentheses. The mean is the equally weighted average of all daily observations over the whole period, 02/01/1996 – 28/12/2010. StDev, Min and Max represent the standard deviation, the minimum daily return and the maximum daily return, respectively. Skew is the Kendall-Stuart measure of skewness, and Kurt is the Kendall-Stuart measure of kurtosis. The table also shows the results from applying the Jarque-Bera test for normality to the daily return series of each stock market. An '***' indicates significance at the 1.0 percent level.

statistics such as skewness (Skew), which examines the symmetry of the return distribution, and kurtosis (Kurt). In addition, the table details the results from applying the Jarque-Bera normality test to the return series of each market. A number of points emerge from inspection of the descriptive statistics within Table 4.2. First, the average returns varied widely across each of the markets. Egypt performed the best over the period with a mean daily return of 0.05 percent and a mean weekly return of 0.26 percent, followed by Nigeria with respective mean daily and weekly returns of 0.04 and 0.19 percent. The worst performer over the whole sample period was Kenya, which showed a mean daily return of 0.00 percent and a mean weekly return of -0.02 percent. The remainder of the African markets in the sample all outperformed the developed market of the UK, which only achieved daily and weekly mean returns of 0.01 and 0.06 percent respectively.

Second an examination of the volatility in returns, as measured by standard deviation, shows that many of the African markets exhibit greater volatility compared to that of the UK. For example the highest volatility of daily and weekly returns was 1.74 and 4.30 percent respectively for Egypt, ranging to the lowest of 0.94 and 2.27 percent in Mauritius. By comparison the standard deviation for the UK returns was 1.15 and 2.56 percent for the daily and weekly results. Surprisingly, both Mauritius and Morocco achieved lower standard deviation of returns within the daily data compared to the UK, with respective daily standard deviations 0.94 and 0.96 percent. In addition, the weekly standard deviation of 2.27 percent in Mauritius is also smaller than that of the UK with the comparable figure for Morocco only slightly higher at 2.64 percent.

Third, the high volatility among the African markets is further demonstrated through examination of the spread between maximum and minimum returns over the whole period. With the exception of Mauritius and Morocco, the spread of returns for each of the emerging markets is larger than that of the UK, indicating a wide variability in returns. Within the daily data Egypt displayed the largest spread in returns of 29.08 percent,

ranging from a high of 10.44 percent to a low of -18.64 percent. In the weekly data South Africa had the largest spread of returns, with a high of 21.67 and a low of -26.38 percent. Furthermore, under the weekly testing conditions all African markets within the sample are shown to have more negative minimum returns compared to that of the UK, where the minimum weekly return is -12.53 percent. Finally the kurtosis, skewness and normality statistics confirm that the return series for the markets are not well approximated by a normal distribution. Without exception, both the kurtosis and skewness statistics are all significant at the 1.0 percent level and normality was rejected for the average returns of all countries considered.

4.3 Method

This chapter uses Johansen (1988) cointegration analysis and Granger causality in order to examine both the long-run relationships and short-term causal effects between the developed market of the UK and eight developing African markets. Cointegration analysis involves measuring the extent to which markets move together over the long-run (whilst allowing for short-term divergences), whereas Granger causality measures how shocks or changes within each of the markets are absorbed in the short-term by the other markets being analysed As highlighted by Alagidede (2009), one potential problem in the interpretation of relationships between markets using a cointegration technique is the difficulty of isolating the cointegrating relationship to particular countries. In order to provide a detailed analysis into the potential for African stock markets to provide a UK investor with an avenue for diversification, this chapter examines the long-term relationships between the UK and every possible combination of African markets.[103] By indicating the extent of interrelations among the markets, both long- and short-term, these

[103] The number of markets differs between the various periods examined due to the exclusion of Botswana and Tunisia from the whole period. With the UK included in every combination of markets tested for cointegration, the total number of combinations are 63 (the whole period and sub-periods 1 and 2), 127 (sub-periods 3 and 4) and 255 (sub-periods 5,6 and 7).

forms of analysis should provide information relevant to later investigations surrounding the benefits to UK based investors of diversifying into African markets.

4.3.1 Unit Root Testing

In order to examine the cointegration between markets it is necessary to first test the individual markets for a unit root. Due to the properties of a non-stationary series, serial correlation of unexpected changes or shocks that occur will gradually die away making it unrealistic to measure the association between two sets of stationary series. Furthermore if variables that are non-stationary are regressed together it can result in misleading inferences not only being made regarding the estimated parameters, but also in terms of the degree of association between them. In order to test for a unit root both the augmented Dickey-Fuller (ADF) (1979) and the Phillip-Perron (P-P) (1988) tests are employed in this analysis. Early work by Dickey and Fuller illustrated that the presence of a unit root within a series could be examined by testing whether the variable Y follows a random walk process, (i.e. the null hypothesis $\psi = 0$, where the series contains a unit root, is tested against the alternative hypothesis of $\psi < 0$, where the series is stationary) using the following three regression models:

$$\Delta Y_t = \psi Y_{t-1} + \epsilon_t \quad (4.1)$$

Where Y_t represents the series at time t; $Y_t - 1$ represents the lagged series at time $t - 1$ and ϵ_t is the white noise error term.

$$\Delta Y_t = \delta + \psi Y_{t-1} + \epsilon_t \quad (4.2)$$

Where δ represents the drift and all other variables are defined as before.

$$\Delta Y_t = \delta + \psi Y_{t-1} + \theta_t + \epsilon_t \quad (4.3)$$

Where θt represents the deterministic trend and all other variables are defined as before.

Where (4.1) is the standard test for a unit root (i.e. a pure random walk model); (4.2) is the test for a unit root with a drift or intercept; (4.3) is the test for a unit root with both an

intercept and a linear time trend. However, as not all time series are well represented by an AR(1) process the original work by Dickey-Fuller was extended via the 'augmented' Dickey-Fuller (ADF) test. The ADF test involves adding an unknown number of lagged first differences K of the dependent variable Y_t to capture auto-correlated omitted variables that would otherwise, by default, enter the error term ϵ_t. The adjustment is made by adding the change in the lagged variable to the model to represent the appropriate AR process represented by the series. The ADF test can therefore be represented by the following equation:

$$\Delta Y_t = \delta + \psi Y_{t-1} + \sum_{i=1}^{k} \beta_j \Delta Y_{t-1} + \epsilon_t \quad (4.4)$$

Where β_j represents a summation of lagged difference terms and the other terms are defined as before

However, the ADF test loses power with significantly large values of K, and so the Phillips-Perron (PP) test, which allows for weak dependence and heterogeneity in disturbances is also employed.

The Phillips-Perron test is estimated as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \epsilon_t \quad (4.5)$$

Where β_1 represents the intercept or drift and $\beta_2 t$ represents the deterministic trend and all other variables are a defined as before. The main difference between the two tests relates to the treatment of 'nuisance' serial correlation. Where the ADF test assumes that disturbance terms are uncorrelated and have a constant variance, the P-P test allows for heteroskedasticity and serial correlation in the error terms.

Table 4.3: Summary of the Currency Exchanged Unit Root Tests

Period	Whole Period:		Period 1: Pre-Asian Crisis		Period 2: Asian Crisis		Period 3: Pre Dot Com		Period 4: Dot Com		Period 5: Post Dot Com		Period 6:Pre Banking Crisis		Period 7: Banking Crisis	
Test	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**
UK	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
BOT	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
EGY	1 (1)	1 (1)	1 (1)	1 (1)	**0** (1)	**0** (1)	1 (1)	1 (1)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
KEN	1 (1)	1 (1)	1 (1)	1 (1)	**0** (1)	**0** (1)	**0** (**0**)	**0** (**0**)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
MAU	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
MOR	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (**0**)	**0** (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (**0**)	1 (**0**)
NIG	1 (1)	1 (1)	1 (1)	1 (1)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
SAF	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
TUN	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

Note: The table displays the daily and weekly UK Sterling converted results for the augmented Dickey-Fuller and Phillip-Perron unit root tests over each of the eight periods examined. A 1 indicates that the unit root test revealed the series to be non-stationary and of order I(1), while a 0 implies that the test revealed the series to be stationary and of order I(0). The daily results are shown without brackets while the weekly results are displayed within brackets.

As noted by Hansen and Juselius (1995) at least two of the variables included in the cointegration test have to be of order I(1), therefore all two-market groups that have a different process (one I(1) market and one I(0) market) cannot be cointegrated. Therefore any of the series that the unit root tests show to be stationary will be removed from the two-market cointegration tests for the period to which they relate. Where a conflict in the ADF and PP results occurs, the decision to remove the market from the two-market group will be based on the latter given its relative strength provided by the method of testing.

A summary of the Sterling converted results for both the ADF and PP unit root tests over all periods are shown in Table 4.3.[104],[105] Several points emerge from an examination of Table 4.3. First, over the whole period and sub-periods one, five and six, for both daily and weekly data, all markets are non-stationary and of the order I(1) at a 1 percent level of significance. However, within the other sub-periods, the unit root tests indicate that several series are stationary, of order I(0) and are therefore removed from the two market testing samples. For example, for daily data Egypt, Kenya and Nigeria are shown to be of order I(0) in sub-period two, Kenya in sub-period three and Egypt, Kenya and Morocco in sub-period four. On a weekly data basis I(0) results are found for Nigeria in sub-period two, Kenya in sub-period three, Egypt and Kenya in sub-period four and Morocco in sub-period seven.

Second, there are very few instances where the data generates conflicting ADF and PP results. In particular, the only instance of a conflict occurs in sub-period four where under daily ADF testing Morocco is deemed to be an I(1) non-stationary series. However, under the PP testing it is deemed to be of order I(0).[106] Due to the greater robustness

[104] Tables showing the full results for the unit root tests can be found in Appendix 4.2 (Tables 4.2.1A–4.2.8A) for the Sterling converted daily tests and Appendix 4.3 (Tables 4.3.1A–4.3.8A) for the Sterling converted weekly tests.
[105] A summary of the local currency unit root tests indication the order of the different markets across each of the time periods can be found in Appendix 4.4 (Table 4.4A).
[106] The opposite effect occurs under the weekly testing for Morocco during the same period.

provided by the PP unit root tests, Morocco is deemed here to be of order I(0) for the purposes of the cointegration testing for this sub-period.[107]

Third, although many of the daily and weekly unit root tests revealed similar results, with the exception of only Morocco during sub-period seven, there were far more instances of a non-stationary I(0) series under the more frequent daily testing results compared to that of the weekly. For example, in sub-period four with daily testing Morocco is deemed to be stationary, of order I(0) and therefore removed from the two market testing groups. Whereas when weekly testing periods are used it is found to be non-stationary and of order I(1). This finding is also apparent for both Egypt and Kenya in sub-period two. Local currency testing (see appendices table 4.4A) produced a similar pattern regarding the differences between daily and weekly results across the testing periods, in fact, no additional markets were deemed stationary of order I(0) under weekly testing compared to, those behaving in such a way on the basis of daily testing. In contrast several of the markets deemed stationary under the daily testing procedure are shown to be non-stationary on a weekly testing basis.[108] This evidence suggests that daily prices within the markets examined tend to follow a mean reversion pattern.

4.3.2 Cointegration

The cointegration analysis is applied to the data to examine the long-run relationship between markets and is estimated by rewriting the vector autoregressive (VAR) model.

[107]An analysis of the unit root testing for the local currency results in Table 4.4A reveals a similar conflict for South Africa in sub-period 1. Again, the additional strength of the PP tests led to the decision to exclude the series from the two-market cointegration tests based upon the strength of the PP results.

[108] In particular, Table 4.4A shows that under the local currency testing daily prices of South Africa in sub-period 1, Egypt in sub-period 2 and Morocco in sub-period 4 were all shown to be stationary of order I(0), yet weekly prices were shown to be non-stationary and of order I(1).

For example, assuming a two-market portfolio consisting of the market indices for UK and Botswana we have:

$$X_t = AX_{t-1} + \varepsilon_t \tag{4.6}$$

Where X_t is the vector of the UK and Botswana at time t, A is the coefficient matrix and ε_t is the error term at time t. This is then re-written into the VAR model for the two markets as:

$$(I - AL)X_t = \varepsilon_t \tag{4.7}$$

Where I is the identity matrix of the two markets and L refers to the number of lags. In other words:

$$X_t = \begin{pmatrix} UK_t \\ BOT_t \end{pmatrix}$$

$$A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$

$$\varepsilon_t = \begin{matrix} \epsilon_{UKt} \\ \epsilon_{BOTt} \end{matrix} \sim BN \left[\begin{matrix} \mathbf{0} \\ \mathbf{0}' \end{matrix} \begin{pmatrix} Var_{(\epsilon 1)} & Cov_{(\epsilon 1, \epsilon 2)} \\ Cov_{(\epsilon 1, \epsilon 2)} & Var_{(\epsilon 2)} \end{pmatrix} \right]$$

If a linear relationship exists between the two markets in which the sequence of the errors are shown to be stationary the markets are said to be cointegrated. Therefore by taking the first difference of both sides of the equation it can be re-arranged as follows:

$$\Delta X_t = \Pi \mathbf{X}_{t-1} + \varepsilon_t \tag{4.8}$$

The test for cointegration under the Johansen method is then calculated by examining the rank of the Π matrix via its eigenvalues. The rank of the matrix is equal to the number of roots (eigenvalues) that are significantly different from zero. Therefore if the rank of the Π matrix is zero, the matrix is null and the variables are non-stationary with embedded unit roots.

There are three possible outcomes of the cointegration analysis employed in this chapter:

1. Where X_t and X_t are I(0), then Π has full rank ($\Pi \neq 0$) i.e. the series are deemed to be stationary and therefore there is no further test for cointegration.
2. Where X_t and X_t are I(1), then Π has rank = 1 ($\Pi = 0$) i.e. the two series are non-stationary and have at least one cointegrating vector. Therefore the series are shown to have a long run relationship and ceterus paribus, only limited diversification benefits.
3. Where X_t and X_t are I(1) and not cointegrated (Π is a null matrix) i.e. the series are non-stationary and do not have a cointegrating vector. Therefore the series are shown to have no long-run relationship and ceteris paribus, provide the potential for efficient diversification. The Johansen test uses two different test statistics in order to test for the existence of r cointegrating vectors: the maximum eigenvalue test and the trace test.[109]

The Maximum eigenvalue test is based on:

$$\lambda_{\max(r,r+1)} = -T ln\left(1 - \hat{\lambda}_{r+1}\right) \tag{4.9}$$

The Trace test examines the equation:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{g} [\ln\left(1 - \hat{\lambda}_i\right]] \tag{4.10}$$

Where r is the number of cointegrating vectors present under the null hypothesis and $\hat{\lambda}_i$ is the ith order eigenvalue taken from the Π matrix. However as the present study aims to identify cases where the lack of a cointegrating relationship, is evident -to provide the

[109]The maximum eigenvalue test uses the null hypothesis that the number of cointegrating relationships is less than or equal to r, against the alternative that there are r + 1 cointegrating relationships. The trace test analyses the null hypothesis that the number of cointegrating relationships is less than or equal to r, against the alternative of more than r cointegrating relationships.

basis for successful diversification- the finding of any cointegrating relationship, based on either the maximum eigenvalue or trace test is deemed to result in a lack of diversification potential between the markets concerned.

4.3.3 Granger Causality

The analysis in this chapter also employs Granger causality to examine the short-term causal effects between the market returns. The Granger causality approach tests the null hypothesis that one market does not Granger-cause another. These tests are useful for examining how shocks from one market transfer to another. Evidence of a short-term causal link between a pair of markets would indicate that the ability for those markets to provide an investor with meaningful diversification benefits would be limited.

4.4 Results

4.4.1 Cointegration

The results of the cointegration analysis both daily and weekly Sterling converted results are detailed in Table 4.4. For each data set the table details the number of no cointegration groups -along with the potential size of the portfolios- that are available within each of the periods and therefore reveals the number of combinations available to a UK investor, which provide the potential to create efficient diversification. The table also shows the maximum number of portfolio groupings that could be created within each period.[110] Finally, the table shows the total percentage of the possible combinations of portfolios within each period that show no cointegration, that is the percentage of the total portfolios tested that are available to a UK investor for diversification. For example, over sub-period one for daily data, 27 of the 63 possible combinations (or 42.86 percent) displayed no cointegration.

[110] Due to limited data availability, the Tunisian index is only available from sub-period 3 onwards and Botswana from sub-period 5 onwards, as a result the maximum number of portfolios that can be created varies across the periods.

Table 4.4: Currency Exchanged Cointegration Results Summary

Period of Testing	Whole Period: 02/01/96 – 28/12/10	Pre-Asian Crisis Period 1: 02/01/96 – 30/06/97	Asian Crisis Period 2: 01/07/97 – 31/12/98	Pre-Dot Com/Post Asian Crisis Period 3: 01/01/99 – 10/03/00	Dot Com Crisis Period 4: 13/03/00 – 09/10/02	Post-Dot Com Crisis Period 5: 10/10/02 – 09/03/05	Pre-Banking Crisis Period 6: 10/03/05 – 08/08/07	Banking Crisis Period 7: 09/08/07 – 28/12/10
Number of markets in Group	*Number of combinations available for diversification based on no cointegration between groups*							
2 Markets	5 (5)	4 (5)	2 (4)	4 (3)	2 (3)	5 (5)	3 (3)	3 (6)
3 Markets	10 (8)	11 (12)	4 (9)	20 (9)	7 (9)	19 (18)	12 (16)	9 (24)
4 Markets	10 (8)	9 (10)	5 (14)	33 (7)	15 (17)	29 (27)	18 (28)	13 (41)
5 Markets	5 (5)	3 (6)	1 (9)	32 (3)	20 (20)	26 (30)	19 (29)	8 (55)
6 Markets	1 (0)	0 (1)	0 (2)	18 (0)	18 (15)	11 (13)	8 (18)	3 (40)
7 Markets	0 (0)	0 (0)	0 (0)	6 (0)	7 (3)	3 (3)	1 (6)	0 (17)
8 Markets	0 (0)	0 (0)	0 (0)	1 (0)	1 (0)	0 (0)	0 (0)	0 (3)
9 Markets	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (1)
Total	**31 (26)**	**27 (34)**	**12 (38)**	**114 (22)**	**70 (67)**	**93 (96)**	**61 (100)**	**36 (187)**
Overall Number of Possible Market Combinations	**63**	**63**	**63**	**127**	**127**	**255**	**255**	**255**
Percentage of Available Market Combinations with Diversification Potential	**49.21% (41.27%)**	**42.86% (53.97%)**	**19.04% (60.31%)**	**89.76% (17.32%)**	**55.12% (52.76%)**	**36.47% (37.65%)**	**23.92% (39.22%)**	**14.12% (73.33%)**

Note: The table shows the number of no-cointegration groups that could be created in the whole period and each of the sub-periods, for Sterling converted daily and weekly cointegration testing. The left hand column shows the number of markets used with the UK always employed as the base market for each group. The table also details the number of total market combinations available within each period at the start of the analysis and then after those series that are found to be stationary have been removed. Finally, the table details the percentage of the remaining combinations of markets, which can provide diversification potential within each period. The weekly data results are displayed in parentheses.

Several points emerge from inspection of Table 4.4. First, the results suggest that the African markets provide very promising potential for UK investors. Over all periods examined, and for both daily and weekly data, the African markets provide the possibility for a UK investor to achieve significant diversification benefits. Within the daily results, over the whole period from 02/01/1996 – 28/12/2010 there are a possible 31 different combinations of portfolios where cointegration is absent ranging from a two market portfolio up to a maximum of a six market portfolio. This figure represents 49.21 percent of the total 63 combinations available during this period. Over the same period for weekly testing the results show a figure of 41.27 percent.[111]

Second, an examination of the sub-period results reveals several differences between the daily and weekly based findings. On the basis of daily data, the period with the highest percentage of available combinations for a UK investor is sub-period three, the Pre-Dot Com crisis period, with 89.76 percent available. In contrast for weekly testing it is sub-period seven, the banking crisis period, which generated the highest figure of 73.33 percent available. The period which offers the lowest percentage of the available combinations for diversification within the daily testing periods is sub-period seven, with only 14.12 percent of the overall combinations without the presence of cointegration, followed by sub-period two with 19.04 percent available. For weekly testing, the lowest percentage available actually occurred in sub-period three the post Asian crisis period, with 17.32 percent available.[112]

Third, the results indicate that in all periods a UK investor would be able to identify instances where cointegration was absent and diversify into at least five different

[111] Similar results over the whole period tested are found for the local currency data in Appendix 4.5 (Table 4.5A), with 21 (or 33.33 percent) and 24 (38.10 percent) of possible portfolios available with no cointegration for daily and weekly testing respectively.

[112] A similar dispersion across the daily and weekly results is also evident within the local currency testing found in Table 4.5A. The highest percentage of possible combinations available for diversification for daily and weekly data occurred in sub-period 3 with 71.65 percent available and sub-period 4 with 59.06 percent available respectively. The lowest possible percentage available for the daily results occurred in sub-period 6 with only 9.41 percent available. The lowest for the weekly data occurred in sub-period 5 (17.25 percent).

markets under both daily and weekly testing. The maximum number of markets that an investor is able to combine is nine and occurs within the weekly testing results in period 7.[113]

Finally, examination of the individual crisis periods reveals further differences between the daily and weekly testing period results. Interestingly, the impact of the various crisis periods appears to have had opposite effects upon the strength of the relationships among the markets across the daily and weekly testing results. For example during the Asian crisis (sub-period two) for daily data, 12 out of 63 (or 19.04 percent) of combinations were free from cointegration – and thereby possibly present effective basis for efficient diversification. However, for the weekly data over the same sub-period 38 of the possible 63 combinations (or 60.31 percent) were available on such a basis. Closer inspection of the markets over this period reveals that, compared to the previous period, for daily data, the extent of inter-relationships between the markets actually increased during the Asian crisis, suggesting that the potential for diversification reduced over the crisis period. In contrast, the opposite effect was observed within the weekly data, where the Asian crisis represented a reduction in the extent of the inter-relationships compared to the previous period suggesting an increase in the diversification potential over the crisis period. In sub-period three, following the Asian crisis, the opposite effect is observed. The total combinations available on the daily testing basis increases dramatically to 89.76 percent, while the percentage of combinations available through the weekly results decreases to 17.32 percent.

A similar pattern across the daily and weekly results is found over sub-period four, the Dot Com crisis, with lower (higher) percentages of 55.12 (52.76) arising for daily (weekly) data compared to the previous period. As with the Asian crisis the weekly data

[113] Similar results evidence emerge from the local currency results with each of the periods examined generating portfolios consisting of more than four markets, within the daily results and five within the weekly. The maximum figure is slightly less than the Sterling results with the possibility of creating an eight market portfolio in sub-period 4, within the weekly results.

also indicates a strengthening of the inter-relationships in the period following the Dot Com crisis with the total no cointegration combinations available falling to 37.65 percent. However, in the case of the daily data, unlike the period following the Asian crisis the percent of total daily combinations available following the Dot Com crisis also fell to 36.47 percent, representing a strengthening in relationships compared to during the crisis. Therefore, whilst on daily data-basis, the extent of cointegration rose both during and after the Dot Com crisis period, with weekly data the crisis appeared to dramatically reduce the strength of market inter-relationships, before the pattern reversed thereafter. In the final period, sub-period seven (covering the recent banking crisis) both the daily and weekly results again show opposite effects compared to the period prior to the crisis, with the daily (weekly) cointegration-free combinations decreasing (increasing) from 23.92 (39.22) percent pre-crisis to 14.12 (73.33) percent during crisis.[114],[115]

Overall these findings suggest that for a UK investor African markets provide the possibility to create well diversified portfolios during times of global economic crisis due to the weak relationships between the African markets and the UK. In particular for the weekly testing results it is demonstrated that the potential for diversification increases during the crisis periods compared to that of the periods prior and post crisis. However, under daily testing conditions the results suggest that the crisis periods impact the potential for diversification among the markets with each crisis examined resulting in a strengthening of the relationships between the markets. This finding provides some

[114] An examination of the daily and weekly local currency results in Table 4.5A reveals similar changes to the inter-relationships surrounding the various crisis periods to those of the Sterling converted results. However in the case of the Asian crisis, the level of the relationships within the weekly results also strengthen compared to the period prior to the crisis, recording a decrease from 41.27 percent pre-crisis to 36.51 percent post crisis. Despite this the levels of the inter-relationships within the weekly results still remain much higher during the crisis periods compared to that of the daily data, and within the Dot Com and recent banking crisis the weekly results continue to show a dramatic decrease in the relationships between the markets compared to the pre-crisis periods.

[115] One possible explanation for the difference between the daily and weekly results is the serial autocorrelation problem caused by the degree of nonsynchronous trading between the UK and many African stock markets, which may have impacted the daily cointegration results. Along with poor liquidity as a result of infrequent trading in many African stock markets it was highlighted in Chapter 3 that many African stock exchanges only operate for several hours a day.

support to the findings of Wang et al. (2003), who found that the diversification potential was reduced during the Asian crisis period, yet post crisis relationships between the African markets were weaker, providing greater diversification potential. In addition, the strengthening of relationships during the recent global crisis, as indicated in the daily analysis, are similar those found by Guidi and Ugur (2014) who examined the impact of the crisis on emerging South-Eastern European stock markets with the developed markets of the UK, Germany and US.[116],[117]

Examination of the detailed nature of the various financial crises and their likely effect on the relationships between the UK and African markets is useful in providing some possible explanations of the patterns found. It is only in recent times that some stock markets within the African region have become more integrated with other world markets and attracted foreign investment (Lagoarde-Segot and Lucey 2007). As such the effects of the Asian financial crisis on the African markets may have been small compared to the impact on other emerging markets. Likewise the Dot Com crisis concentrated on a relatively under-developed sector in African markets and thus might have been expected to have a limited impact on the markets. However, in the case of both crises the impact on the extent of co-integration, in particular on the basis of the daily testing results, is non-neglible, suggesting that their impact is more pronounced than a-priori reasoning might suggest. With particular reference to the daily testing results, the recent banking crisis also had a drastic effect on the relationships between the markets causing them to strengthen and reduce the potential for diversification.

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[116] Their analysis utilised both Johansen and dynamic cointegration techniques to examine the impact that the recent global crisis had on the relationships between the markets and their potential for diversification. Their findings indicated that prior to the global crisis very few cointegration vectors existed between the South-Eastern European stock markets and the UK, US or German markets. However during 2008 - 2010 the number of cointegration vectors increased dramatically before reducing to their pre-crisis levels at the end of 2010.

[117] The daily local currency results, with the exception of the recent banking crisis, where there is very little change in the level of inter-relationships pre and during crisis also find support for findings of Wang et al. (2003) as the relationships between the markets strengthen during the crisis period and weaken in the period following the crisis.

Table 4.5: Currency Exchanged Market Occurrence in the Cointegration-Free Portfolios

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Sub-period Totals
Total Cointegration-free combinations in each period	31 (26)	27 (34)	12 (38)	114 (22)	70 (67)	93 (96)	61 (100)	36 (187)	**413 (544)**
	Number of Occurrences Within Each Period								
BOT	N/A	N/A	N/A	N/A	N/A	35 (43)	0 (30)	22 (92)	**57 (165)**
EGY	16 (15)	6 (9)	9 (21)	55 (6)	35 (28)	0 (1)	27 (44)	15 (104)	**147 (213)**
KEN	18 (13)	10 (14)	5 (17)	57 (2)	33 (36)	43 (47)	26 (51)	18 (102)	**192 (269)**
MAU	13 (14)	15 (21)	4 (17)	56 (9)	59 (46)	34 (34)	41 (61)	10 (80)	**219 (268)**
MOR	11 (8)	13 (16)	5 (23)	59 (16)	38 (37)	51 (51)	13 (19)	20 (102)	**199 (264)**
NIG	10 (5)	9 (14)	1 (12)	64 (12)	42 (42)	49 (51)	35 (52)	5 (81)	**205 (264)**
SAF	12 (10)	12 (14)	5 (20)	58 (4)	31 (18)	47 (47)	24 (48)	3 (72)	**180 (223)**
TUN	N/A	N/A	N/A	55 (5)	42 (38)	48 (51)	37 (56)	14 (95)	**196 (245)**

Note: The table reports the number of occurrences of each market within the cointegration-free portfolios during each of the periods examined for the Sterling converted results. The sub-period total column shows the total number of occurrences for each of the markets across all of the sub-periods excluding the whole period. The weekly results are displayed in brackets.

Table 4.5 shows the number of occurrences of each African market in the cointegration-free portfolio combinations, reported in Table 4.4.[118] Analysis of the table reveals some notable patterns in the data. Over the whole period the most frequently occurring market in daily data is Kenya, occurring in 18 out of the 31 cointegration-free combinations, while Egypt, shown to be one of the more developed markets during the period, surprisingly occurs most frequently in the weekly results (15 out of the possible 26). In contrast, Nigeria is the least frequently occurring market in both daily and weekly data across the whole period, occurring in only 10 out of 31 and 5 out of 26 respectively. Despite Egypt being weakly related to the UK across the whole period, it is the least frequently occurring market in both daily and weekly tests during the sub-periods, appearing in only 147 of the total 413 daily combinations and 213 of the 544 weekly. South Africa is the second least frequently occurring market, appearing in only 180 and 223 of the respective daily and weekly cointegration-free portfolios. This result is unsurprising given the relative size and development their stock markets compared to the other African markets during the testing period.[119] Mauritius is the most frequently occurring market across the sub-periods in the daily results (219 out of 413) and is only marginally the second most frequently occurring in the weekly results (268 out of 544), with Kenya being the most frequent (269 out of 544).

During all three of the financial crises periods examined each African market occurred in some of the cointegration-free combinations. The only two cases where a market was excluded from the portfolios was Egypt (in period five, post-Dot Com crisis) and Botswana (in period six pre-banking crisis).[120] The table also reveals the impact that

[118] The results in Table 4.5 are impacted by Tunisia and Botswana, which due to data restrictions were not included in the testing until sub-periods three and five respectively.
[119] Although Botswana occurs less frequently than both Egypt and South Africa within the daily and weekly results it was not included within the testing until period five and as such is not comparable across all sub-periods.
[120]For the local currency daily data-based testing in Appendix 4.6 (Table 4.6A), the Asian crisis (sub-period 2) and recent banking crisis (sub-period 7) resulted in the exclusion of Nigeria from any of the groups of markets. This was also the case for Egypt and Botswana within sub-periods five and six respectively. For

various periods of financial crises had on the different African markets in the sample. For example, during the Dot Com crisis and the recent Banking crisis, South Africa appears to have been most affected showing a strengthening of relationship with the UK. That is, South Africa is the least present market in the cointegration-free portfolios. Surprisingly, Egypt, another large market in the sample does not seem to follow the same pattern and is in fact the most included market within the cointegration-free portfolios during the 2007 global crisis using weekly data (104 out of a possible 187). However, among the other African markets there is a degree of variation in the strength of the relationships with the UK across the various crisis periods. For instance, during the Asian crisis, Egypt is the most present under the daily testing (9 out of 12) and Morocco under the weekly (23 out of 38). In the Dot Com crisis Mauritius is the most present under both daily (59 out of 70) and weekly (46 out of 67) testing conditions and in the recent banking crisis Morocco occurs the most under the daily tests (20 out of 36) and is the second most frequent behind that of Egypt under weekly testing (102 out of 187).

Overall, these findings suggest that African markets can provide UK investors an avenue for diversification across all periods examined including during periods of global instability. However, it is also clear that the impact of each crisis on the African markets varied markedly, depending upon the particular crises period examined. This suggests that the type of crisis and the factors surrounding it are important in establishing the likely impact that a global economic downturn has on the long-run relationships between the UK and African markets. Similar findings surrounding the differing impact of various financial, economic and political events upon African stock markets were also highlighted by Lagoard-Segot and Lucey (2007). Examining the pre- and post-impact of various events they concluded that, due to differing stock market reactions among African markets, they should not be viewed as a single group for portfolio allocation purposes.

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weekly testing, Nigeria again during sub-period 2 and both Egypt and Mauritius (in sub-period five) were absent from all groups.

Tables 4.6 and 4.7 show the results of a chi-squared analysis, for both the daily and weekly data, on the number of market occurrences in the cointegration-free portfolios. Specifically, the table shows the observed occurrences of each market in each period examined and the expected occurrences which is the number occurrences we would expect to see if the there was no difference between the number of cointegration-free inclusions across the various African markets and periods examined. Finally, the table also shows the chi-squared test statistic for each of the tests conducted.[121],[122] Both tables show high overall values of the Chi-Squared test statistic and strongly reject the null hypothesis that there is no difference between the numbers of instances each market is included in the cointegration-free portfolios across the various periods considered. Furthermore, after reducing the Chi-Squared statistics to account for Botswana and Tunisia not being included until later periods, the total Chi-Squared statistic within the daily testing group is 253.472 and for the weekly testing 178.995, which are both still significantly large, based on 49 degrees of freedom, to reject the null hypothesis.[123]

Several additional points arise through closer inspection of the tables. First, despite only being included in the final three periods, within the daily data Botswana is the highest contributor to the overall Chi-Squared statistic, with a total χ^2 of 130.152. The majority of this statistic derives through a more than expected the occurrence of

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[121] It is important to note that several of the expected counts within both tables are less than 5. This can have an impact on the overall chi-squared figure which can be affected by small differences in cells with low counts. However, providing the number of cells with expected values of less than 5 is not more than 20 percent of the total number of cells, the overall chi-squared figure should not be affected (Berman and Wang, 2012). Despite the number of cells with expected counts of less than 5 being under 20 percent of the total number of cells in both tables, the results of the Chi-Squared analysis should still be interpreted with caution.

[122] The expected values and individual Chi-Squared statistics for Botswana, during periods 1 – 5 and for Tunisia during periods 1 – 2 are not valid. Due to data restrictions both markets were included in the analysis at later time periods and, as such, their expected values and Chi-Squared statistics are not applicable.

[123] The results of the local currency Chi-Squared tests on the number of market occurrences in the cointegration-free portfolios are included in Appendix 4.7 and 4.8. An examination of the table reveals similar conclusions to that of the Sterling converted tests with both tables strongly rejecting the null hypothesis of no difference between the number of market inclusions across the periods. As with the Sterling converted results, reducing the chi-squared figure to account for Botswana and Tunisia reduces the total daily χ^2 to 208.53 and the weekly to 187.19 which, based on 49 degrees of freedom are still large enough to reject the null hypothesis.

Table 4.6: Chi-Squared Tests for Market Occurrence in the Daily Currency Exchanged Cointegration-Free Portfolios

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Total
BOT						35 11.86 45.12	0 7.84 7.845	22 4.13 77.187	**57**
EGY	16 8.84 5.798	6 7.18 0.195	9 3.2 10.48	55 44.65 2.402	35 30.94 0.532	0 33.93 33.926	27 22.43 0.93	15 11.82 0.853	**163**
KEN	18 11.39 3.836	10 9.25 0.06	5 4.13 0.184	57 57.52 0.005	33 39.86 1.182	43 43.71 0.011	26 28.9 0.291	18 15.23 0.502	**210**
MAU	13 12.58 0.014	15 10.22 2.231	4 4.56 0.069	56 63.54 0.896	59 44.04 5.081	34 48.29 4.227	41 31.93 2.577	10 16.83 2.772	**232**
MOR	11 11.39 0.013	13 9.25 1.516	5 4.13 0.184	59 57.52 0.038	38 39.86 0.087	51 43.71 1.216	13 28.9 8.749	20 15.23 1.491	**210**
NIG	10 11.66 0.237	9 9.47 0.024	1 4.23 2.464	64 58.89 0.444	42 40.81 0.034	49 44.75 0.404	35 29.59 0.989	5 15.6 7.2	**215**
SAF	12 10.41 0.242	12 8.46 1.48	5 3.77 0.398	58 52.59 0.557	31 36.45 0.814	47 39.96 1.24	24 26.42 0.222	3 13.93 8.574	**192**
TUN				55 53.68 0.032	42 37.21 0.617	48 40.79 1.273	37 26.97 3.726	14 14.22 0.003	**196**
Total	**80**	**65**	**29**	**404**	**280**	**307**	**203**	**107**	**1475**

Chi-Squared = 309.751, DF = 49, P-Value = 0.000 Note: 11 cells with an expected count of less than 5

Table 4.7: Chi-Squared Tests for Market Occurrence in the Weekly Currency Exchanged Cointegration-Free Portfolios

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Total
BOT						43 27.14 9.271	30 30.14 0.001	92 60.79 16.024	**165**
EGY	15 7.5 7.5	9 10.15 0.131	21 12.69 5.438	6 6.23 0.009	28 28.27 0.003	1 37.5 35.527	44 41.65 0.132	104 84 4.762	**228**
KEN	13 9.28 1.495	14 12.56 0.165	17 15.7 0.108	2 7.71 4.226	36 34.96 0.031	47 46.38 0.008	51 51.52 0.005	102 103.89 0.035	**282**
MAU	14 9.28 2.405	21 12.56 5.674	17 15.7 0.108	9 7.71 0.217	46 34.96 3.483	34 46.38 3.305	61 51.52 1.745	80 103.89 5.496	**282**
MOR	8 8.95 0.1	16 12.11 1.247	23 15.14 4.078	16 7.43 9.873	37 33.72 0.318	51 44.74 0.877	19 49.69 18.957	102 100.21 0.032	**272**
NIG	5 8.85 1.674	14 11.98 0.341	12 14.97 0.591	12 7.35 2.94	42 33.35 2.242	51 44.24 1.032	52 49.14 0.166	81 99.11 3.308	**269**
SAF	10 7.66 0.712	14 10.38 1.265	20 12.97 3.81	4 6.37 0.88	18 28.89 4.104	47 38.32 1.965	48 42.57 0.693	72 85.84 2.232	**233**
TUN				5 6.7 0.429	38 30.38 1.913	51 40.3 2.843	56 44.76 2.823	95 90.26 0.249	**245**
Total	**65**	**88**	**110**	**54**	**245**	**325**	**361**	**728**	**1976**

Chi-Sq = 258.532, DF = 49, P-Value = 0.000 Note: 1 cell with an expected count of less than 5

The table shows the results of the Chi-Squared tests on the number of market occurrences in each of the cointegration-free portfolios. The table details for each market the number of instances where it was present in the no-cointegration portfolios, the expected number of instances assuming an association between the markets and finally the Chi-Squared statistic for each market in each period.

Botswana during sub-periods five and seven suggesting that it is less related to the other markets in the sample during these periods. Furthermore, with a Chi-Squared statistic of 77.187 during the recent global crisis, Botswana could have been a good addition to a UK portfolio. By comparison, the lowest contributor to the overall Chi-Squared statistic was Tunisia, with a cumulative χ^2 of 5.651, followed by Kenya with a cumulative χ^2 of 6.071. Similar findings are documented in Table 4.7 which shows the weekly results. Botswana is amongst the highest contributors to the overall Chi-squared statistic in sub-periods five and seven, thus demonstrating a more than expected occurrence. However, in the case of the weekly results, Egypt contributes most to the overall statistic with a cumulative χ^2 value of 53.502 across all periods examined. The majority of Egypt's overall Chi-Square statistic originates within sub-period five, where the observed value of one is significantly less than the expected value of 37.5. This finding supports the earlier observation that Egypt displays a stronger relationship with the UK during the post-crisis periods.

Second, there are a number of instances where large values of the Chi-Squared statistic are displayed.[124],[125] Interestingly, it is only after sub-period four that these large values indicate there has been fewer market occurrences than expected. For example, within the daily testing during sub-period five, Egypt occurs less than would be expected and within sub-period six (seven) Botswana and Morocco (Nigeria and South Africa), appear less often than would be expected. Similarly, within the weekly testing, Egypt in sub-period five, Morocco in sub-period six and Mauritius in sub-period seven all occur less than would be expected. The remainder of the instances with large values of the χ^2 all refer to cases where the market had been involved within the cointegration-free

[124] For the purpose of this analysis, large values of the Chi-Squared statistic are deemed to be those that contribute greater than 5 towards the overall value of the total χ^2 figure.

[125] Specifically, within the daily testing results, large values of χ^2 are indicated by Botswana (sub-periods 5, 6 and 7), Egypt (the whole 15 year period and sub-periods 2 and 5), Mauritius (sub-period 4), Morocco (sub-period 6) and Nigeria and South Africa (sub-period 7). Within the weekly results, Botswana (sub-periods 5 and 7), Egypt (the whole 15 year period and sub-periods 2 and 5), Mauritius (sub-period 1 and 7) and Morocco (sub-period 3 and 6) have large χ^2values.

portfolios more than would be expected. This finding may indicate that as African markets become more developed their relationships with each other and the UK continue to strengthen, thus reducing their diversification potential for a UK investor.[126]

Finally, the observation that South Africa becomes more closely related to the UK, especially during the recent global crisis, is backed up by the daily Chi-Squared test results. Specifically, within the daily testing results, the observed counts for South Africa total three while the expected counts are 13.93, producing a χ^2 figure of 8.574. Similar findings were also noted during the same period for Nigeria for the daily analysis and Mauritius using weekly data, where both occurred less than would be expected, demonstrating a strengthening of the relationships during this period. In contrast to this finding, several markets occurred in more portfolios than expected during times of global crisis. Specifically, during sub-period two which covers the Asian crisis Egypt occurred more than would be expected using both daily and weekly data. Similarly, during sub-period four, the Dot Com period, Mauritius appeared in more cointegration-free portfolios than would be expected.

4.4.2 Granger Causality

Whole Period Analysis

The results for the Granger causality test over the whole period are shown in Table 4.8. The tables shows how short-term causal shocks are transmitted between the different markets in the sample. The 'cause' column on the left of the table indicates the market that the shock originates from while the 'effect' row at the top indicates which of the markets are affected. The table therefore illustrates which markets within the sample lead (or 'Granger cause') the other markets and which of the markets respond to these shocks.

[126] Within the local currency tests (Appendix 4.7 and 4.8) a similar pattern of markets occurring more and less than expected pre and post sub-period 4 is found. However, in the case of the local currency results, Morocco occurs less than would be expected within the whole 15 year period (once in the cointegration-free portfolios), for both daily and weekly data.

An examination of Table 4.8 reveals several points regarding the transmission of short term effects among the sample of markets. First, an examination of the daily Granger results in Table 4.8 reveals that the UK appears very influential within the African region. Specifically, the table shows that the UK Granger causes all African markets in the sample to at least a five percent level of significance. This finding suggests that any extreme changes to stock market prices within the developed market of the UK will quickly be absorbed by the lesser developed markets of Africa. This finding contrasts those found by Agyei-Ampomah (2011), who noted that many African stock markets remained largely segmented from the global market during 1998 to 2007 and suggests that potential for diversification of UK investor may be limited in the short-term. Second, within the African region itself, the larger and more developed market of South Africa is one of the most influential, being shown to Granger cause Egypt, Kenya and Mauritius. Several of the markets also appear to exhibit a two-way Granger relationship, with shocks being transmitted both from and to certain pairs of markets. For example, South Africa and Egypt, the two largest markets in Africa have a two way Granger causal relationship. A similar relationship is also found between Kenya and Nigeria.[127]

Third, examination of the weekly results indicates several differences between the daily and weekly causality.[128] For example, using weekly returns the UK appears to hold less influence over the African markets. In particular, under weekly testing the UK shows no causal relationship with Morocco or South Africa.

[127] It is perhaps unsurprising that the two largest of the African stock markets, South Africa and Egypt are among the most influential among the African stock market group. However, in the case of the smaller stock markets there is no obvious explanation for some of the causal relationships indicated. One problem with this type of analysis is that the results provide statistical evidence but do not indicate an economic rationale for the causal relationships displayed.

[128] The local currency based Granger causality results can be found in Appendix 4.9 (Table 4.9A), for the whole period results and Appendix 4.10 (Table 4.10A), for the individual sub-period results. Over the whole testing period the results reveal far more causal relationships than on a Sterling basis. This suggests that the exchange rate has an impact on the strength of the relationships between the UK and the African markets in the sample.

Table 4.8: Granger Causality Tests for Daily and Weekly Currency Exchanged Data 02/01/1996 – 28/12/2010

		Effect						
Cause		**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
	EGY		0.7404 (**0.0001**[a])	0.8380 (**0.0002**[a])	0.7426 (0.5005)	0.3229 (**0.0012**[a])	**0.0042**[a] (0.7784)	0.8910 (0.3564)
	KEN	0.1320 (0.0611)		0.8903 (**0.0060**[a])	0.1929 (0.1793)	**0.0000**[a] (0.0734)	0.1038 (0.1305)	0.6575 (0.5565)
	MAU	**0.0181**[b] (0.5161)	**0.0450**[b] (**0.0077**[a])		0.1837 (0.1993)	**0.0007**[a] (0.1824)	0.1239 (0.7029)	0.9934 (0.6914)
	MOR	**0.0013**[a] (0.3832)	0.1970 (0.7220)	0.5418 (0.9878)		0.5384 (0.0537)	0.1050 (0.7348)	**0.0009**[a] (0.8828)
	NIG	0.3285 (0.4680)	**0.0069**[a] (0.7419)	0.7128 (**0.0025**[a])	0.8177 (0.4703)		0.9598 (0.5494)	0.4430 (0.4502)
	SAF	**0.0000**[a] (**0.0000**[a])	**0.0052**[a] (**0.0007**[a])	**0.0408**[b] (**0.0012**[a])	0.1181 (0.5956)	0.2410 (0.3911)		0.1214 (0.4287)
	UK	**0.0000**[a] (**0.0000**[a])	**0.0122**[b] (**0.0001**[a])	**0.0000**[a] (**0.0000**[a])	**0.0078**[a] (0.3006)	**0.0269**[b] (**0.0004**[a])	**0.0000**[a] (0.7903)	

Note: This table reports the Sterling converted results for the Granger causality testing over the whole period 02/01/1996 – 28/12/2010. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The markets in the left hand column of all the tables refer to the dependant variable or the lead markets. The markets in the top columns in each table refer to the independent variables or the effected markets. The table shows the results from both the daily and weekly testing, with the weekly testing results shown in brackets. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level. The weekly results are displayed in parentheses.

Furthermore, while South Africa remains the most influential of the African markets, the causal relationships between the remaining African markets change. For example, the influence of Mauritius on three African markets is reduced to one nation, Kenya within the weekly testing. More generally, the number of two-way causal relationships is lower under weekly testing conditions, with only Mauritius and Kenya still displaying a two-way Granger causal links.[129]

Finally, one market which appears to be independent of all others in the sample is Morocco, which is not caused -in either the daily or weekly testing- by any of the other markets, with the exception of only the UK within the daily testing results. Furthermore, Morocco also has no causal effects on any markets in the weekly testing and only displays a causal effect upon Egypt and surprisingly the UK under the daily testing. This supports the findings of Wang et al. (2003) who noted that in the post Asian crisis period Morocco had become independent from all other African stock markets and suggests that Morocco could be a good inclusion to an investment portfolio consisting of African markets

Sub-Period Analysis

Table 4.9 documents the Sterling converted sub-period Granger causality results for both daily and weekly testing. These tables permit analysis of the impact of the various crises periods on the cause and effect relationships between the sample markets.

The Asian Crisis

The pre, during and post-Asian Crisis time spans are examined in the present study as sub-periods one, two and three respectively. The results revealed in Table 4.9 suggest that prior to the Asian Crisis there was very little short-term causality between the markets, in particular amongst the African markets themselves. The data reveal that, within the African markets, Morocco and Egypt both lead Nigeria and Egypt leads South

[129] Similar findings were also displayed under the local currency testing Table 4.9A with the daily testing period showing far more causal links between the markets compared to that of the weekly testing.

Africa under weekly testing. This pattern is to be expected, particularly in the case of Egypt which is far more developed that that of Nigeria in the period concerned (1996 – mid 1997). Surprisingly the UK, which is the most dominant over the whole period, does not show causal relationships with any of the sample African markets prior to the Asian crisis, perhaps highlighting the underdeveloped nature of the African markets during this early period.

During the crisis period there is then a clear reduction in the number of causal relationships between the African markets. With the exception of South Africa and the UK, which are now both shown to Granger cause Mauritius under the daily test conditions, all other markets show no causal relationships during this period. Moving to the post-crisis period (sub-period three), the UK shows no causal links with any of the African markets, however several causal relationships are again registering amongst the African markets. Specifically, within the daily testing results Egypt is shown to Granger cause Mauritius and Kenya is shown to cause Tunisia, while on a weekly testing basis Nigeria and Tunisia are both shown to Granger cause South Africa. The general pervasive impression that can be learned from inspection of the tables is the very limited effect of the Asian crisis on the African markets.[130] Furthermore, it is also apparent that the daily results display more of the causal relationships compared to the weekly, demonstrating that the effect of shocks transmitted between certain African markets do not seem to persist over longer periods of time. This overall lack of causality can likely be attributed to the lack of development in this particular group of markets and the attendant lack of integration into the global market system.

[130]Examination of the local currency Granger causality results in Table 4.10A reveals a similar pattern over the Asian crisis period. As with the Sterling results the only causal relationship between the African markets is that of South Africa, which Granger causes Morocco. However post-crisis there notably less relationships between the African markets, the only one being Mauritius, which Granger causes Nigeria. Interestingly, within the first three periods there are no instances of causality within the weekly results, with the exception of only Egypt, which is seen to have a causal effect on the UK during sub-period 3.

Table 4.9: Granger Causality Results for Currency Exchanged Data over all Sub-Periods

Period 1: Pre Asian Crisis							
Cause	**Effect**						
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
EGY		0.2211 (0.0807)	0.3362 (0.1030)	0.7699 (0.4164)	**0.0042**[a] (0.2811)	0.6175 (**0.0035**[a])	0.3808 (0.4270)
KEN	0.3738 (0.0867)		0.8698 (0.0996)	0.4626 (0.9927)	0.3894 (0.3754)	0.6909 (0.6051)	0.3212 (0.6555)
MAU	0.9228 (0.6449)	0.7691 (0.8066)		0.9684 (0.5027)	0.2598 (0.2755)	0.8175 (0.4263)	0.4520 (0.6666)
MOR	0.6443 (0.3541)	0.1413 (0.5927)	0.5139 (0.9299)		**0.0093**[a] (0.9277)	0.7777 (0.2493)	0.7175 (0.5416)
NIG	0.9489 (0.8883)	0.7156 (0.1438)	0.9857 (0.4998)	0.4411 (0.0940)		0.4090 (0.9088)	0.7138 (0.4235)
SAF	0.1160 (0.1521)	0.9866 (0.7169)	0.6893 (0.5768)	0.8065 (0.3570)	0.5969 (0.5951)		0.2765 (0.9981)
UK	0.9295 (0.0798)	0.7526 (0.7764)	0.7992 (0.7845)	0.8539 (0.8033)	0.3962 (0.4777)	0.3693 (0.7452)	
Period 2: Asian Crisis							
Cause	**Effect**						
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
EGY		0.6174 (0.3908)	0.3314 (0.6433)	0.3725 (0.4821)	0.4016 (0.4588)	0.6611 (0.8638)	0.5449 (0.2443)
KEN	0.9963 (0.7790)		0.4728 (0.7473)	0.5909 (0.3151)	0.7998 (0.6554)	0.7825 (0.9410)	0.5896 (0.9704)
MAU	0.5327 (0.9387)	0.8623 (0.9137)		0.9572 (0.3225)	0.7745 (0.1484)	0.8882 (0.0701)	0.6198 (0.4817)
MOR	0.8770 (0.8992)	0.5102 (0.6456)	0.5445 (0.2661)		0.9864 (0.3321)	0.6847 (0.5610)	0.7114 (0.7212)
NIG	0.7210 (0.4849)	0.7005 (0.2568)	0.6205 (0.1069)	0.9778 (0.8101)		0.3728 (0.1887)	0.4726 (0.1265)
SAF	0.2743 (0.5053)	0.7414 (0.2692)	**0.0489**[b] (0.6901)	0.3456 (0.6363)	0.4421 (0.2876)		0.9552 (0.9838)
UK	0.3614 (0.5729)	0.0662 (0.8188)	**0.0043**[a] (0.3103)	0.3655 (0.5889)	0.6455 (0.2093)	0.5940 (0.4170)	

Note: This table reports the Sterling converted results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependent or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Table 4.9 Continued: Granger Causality Results for Currency Exchanged Data over all Sub-Periods

Period 3: Post Asian Crisis/ Pre-Dot Com Crisis								
Cause	**Effect**							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
EGY		0.3193 (0.4095)	**0.0465**[b] (0.7868)	0.2974 (0.6663)	0.1471 (0.3586)	0.4675 (0.7407)	0.9337 (0.2265)	0.1553 (0.1362)
KEN	0.3730 (0.3903)		0.9359 (0.4923)	0.9263 (0.2230)	0.3617 (0.5630)	0.4066 (0.4632)	**0.0412**[b] (0.6924)	0.2667 (0.0864)
MAU	0.6094 (0.9467)	0.8164 (0.9768)		0.3334 (0.9376)	0.9291 (0.5262)	0.6639 (0.3614)	0.2731 (0.4562)	0.3307 (0.3740)
MOR	0.1966 (0.5771)	0.8578 (0.4577)	0.8599 (0.8588)		0.9386 (0.4902)	0.6640 (0.1243)	0.3655 (0.6315)	0.8484 (0.9326)
NIG	0.6369 (0.5187)	0.7772 (0.6921)	0.3915 (0.2286)	0.9910 (0.8108)		0.6062 (**0.0428**[b])	0.7757 (0.3418)	0.7025 (0.3615)
SAF	0.7085 (0.3741)	0.4575 (0.3498)	0.5955 (0.5681)	0.9179 (0.6195)	0.8789 (0.4446)		0.2286 (0.5586)	0.1000 (0.8349)
TUN	0.6016 (0.1944)	0.1525 (0.7473)	0.6724 (0.1610)	0.8430 (0.4483)	0.5013 (0.3793)	0.1426 (**0.0431**[b])		0.2323 (0.0938)
UK	0.7216 (0.6749)	0.9018 (0.6104)	0.1700 (0.8303)	0.4648 (0.3809)	0.5717 (0.7319)	0.7273 (0.7328)	0.5096 (0.7798)	
Period 4: Dot Com Crisis								
Cause	**Effect**							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
EGY		0.7445 (0.6829)	0.6431 (0.6245)	0.7256 (0.4275)	0.4488 (0.5681)	0.3559 (0.8755)	0.1213 (0.1573)	0.8336 (0.6624)
KEN	0.3104 (0.9562)		0.4761 (0.9702)	0.0972 (0.3114)	0.2137 (0.9748)	**0.0249**[b] (0.5959)	0.8077 (0.1722)	0.3924 (0.3574)
MAU	0.5395 (0.5827)	0.8277 (0.9460)		0.5136 (0.1227)	**0.0340**[b] (0.3584)	0.1235 (0.5899)	0.8552 (0.9630)	0.1931 (0.7583)
MOR	0.4124 (0.5663)	0.3688 (0.5309)	0.2369 (0.2841)		0.5871 (0.6976)	0.3123 (0.3113)	0.8132 (0.9844)	0.0463 (0.8202)
NIG	0.5321 (0.2864)	0.5771 (0.5448)	0.5208 (0.1000)	0.8301 (0.1482)		0.4830 (0.8287)	0.7279 (0.1994)	0.4910 (0.4717)
SAF	0.0673 (**0.0031**[a])	0.2095 (0.1310)	0.2593 (0.3389)	0.3819 (0.4349)	0.7962 (0.2365)		0.8396 (**0.0013**[a])	0.5943 (0.5404)
TUN	0.8311 (0.8732)	0.6981 (**0.0236**[b])	0.9405 (0.2584)	0.2873 (0.2848)	0.1435 (0.3651)	0.8592 (0.8015)		0.4890 (0.9966)
UK	**0.0453**[b] (**0.0197**[b])	**0.0264**[b] (0.1882)	0.1391 (0.7447)	0.2462 (**0.0221**[b])	0.2848 (**0.0065**[a])	**0.0000**[a] (0.7610)	0.4638 (**0.0206**[b])	

Note: This table reports the Sterling converted results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependent or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Table 4.9 Continued: Granger Causality Results for Currency Exchanged Data over all Sub-Periods

Period 5: Post Dot Com Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		0.6017 (0.5787)	0.3977 (0.2300)	0.3189 (0.1899)	0.6094 (0.7653)	0.1587 (0.6209)	0.1995 (0.5849)	0.9254 (0.6130)	0.1554 (0.5998)
EGY	**0.0164**[b] (0.5500)		0.4056 (0.5308)	0.6066 (0.6110)	0.6496 (0.9000)	0.8678 (0.6256)	0.1500 (0.5703)	0.2489 (0.1153)	0.4004 (0.7047)
KEN	0.8805 (0.2515)	0.6798 (0.9387)		0.1458 (0.3612)	0.9794 (0.7377)	0.0891 (0.7233)	0.4659 (0.6786)	0.8752 (0.3853)	0.5222 (0.8260)
MAU	0.0606 (0.1068)	0.4781 (0.4013)	0.9006 (0.3567)		0.2742 (0.8999)	0.5354 (0.1872)	0.2534 (**0.0208**[b])	0.2228 (0.1273)	0.7965 (0.0510)
MOR	0.6250 (0.8527)	0.0805 (0.4580)	0.5779 (0.2329)	0.0724 (0.3498)		0.4868 (0.8771)	0.7562 (0.2002)	0.0555 (0.8445)	0.7774 (0.4174)
NIG	0.5728 (0.9251)	0.6258 (0.6226)	0.9927 (0.5657)	0.7477 (**0.0298**[b])	0.8482 (0.6325)		0.7693 (0.6871)	0.8408 (0.6493)	0.7325 (0.2793)
SAF	0.5082 (0.9151)	0.0538 (0.1035)	1.0000 (0.9067)	**0.0315**[b] (0.9501)	0.6239 (0.4531)	0.3284 (0.9328)		0.5198 (0.7285)	**0.0190**[b] (0.5425)
TUN	0.6221 (0.962)	0.2666 (0.5878)	0.8161 (0.8091)	0.0859 (0.8093)	0.1924 (0.2512)	0.9798 (0.9188)	0.7630 (0.1383)		0.7196 (0.7946)
UK	0.1429 (0.9491)	0.0644 (0.9980)	**0.0442**[b] (0.3228)	0.3331 (0.1456)	0.0600 (0.3022)	0.7326 (0.2936)	0.0814 (0.2012)	0.2737 (0.1086)	
Period 6: Pre-Banking Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		0.6465 (0.8697)	0.0551 (0.5740)	0.3662 (0.3535)	**0.0023**[a] (0.3075)	**0.0028**[a] (0.8381)	0.8236 (0.5575)	0.6188 (0.9002)	0.0760 (0.3062)
EGY	0.8661 (0.5433)		**0.0184**[b] (0.5286)	**0.0443**[b] (0.7659)	0.7255 (0.3123)	0.0618 (0.7449)	0.1647 (0.7285)	0.3352 (0.3965)	0.5386 (0.4067)
KEN	0.2402 (0.7595)	0.1113 (0.8491)		0.5991 (0.6479)	0.5146 (0.1286)	**0.0029**[a] (0.6992)	0.5837 (0.4062)	**0.0088**[a] (0.8575)	0.3065 (0.5951)
MAU	0.8224 (0.9698)	0.6400 (0.7336)	**0.0142**[b] (0.3349)		0.1160 (0.2270)	**0.0008**[a] (0.5354)	0.9665 (0.3463)	0.4787 (0.4628)	0.7057 (0.9197)
MOR	0.6788 (0.4629)	0.4584 (0.4730)	0.2762 (0.9077)	0.3109 (0.4080)		0.6925 (0.2921)	0.7282 (0.6976)	0.7670 (0.8464)	0.4208 (0.7852)
NIG	0.0898 (0.8692)	0.3180 (0.4723)	**0.0016**[a] (0.9386)	0.2302 (0.4189)	0.4957 (0.5885)		0.2492 (0.2895)	0.6445 (0.8165)	0.1668 (0.5532)
SAF	0.1409 (0.6365)	**0.0001**[a] (**0.0000**[a])	0.5923 (0.1933)	0.5199 (0.1529)	0.1677 (**0.0042**[a])	0.8524 (0.7604)		0.6951 (0.4628)	0.5069 (0.6649)
TUN	0.8486 (0.3278)	0.6702 (0.9871)	0.7894 (0.9681)	0.9292 (**0.0366**[b])	0.6210 (0.8904)	**0.0024**[a] (0.8466)	0.6615 (0.9570)		0.0868 (0.9017)
UK	0.3833 (0.6989)	**0.0007**[a] (**0.0013**[a])	0.6176 (0.1083)	0.5963 (0.1666)	0.1687 (0.1495)	0.6097 (0.3173)	**0.0096**[a] (0.4731)	0.2673 (0.8317)	

Note: This table reports the Sterling converted results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependent or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Table 4.9 Continued: Granger Causality Results for Currency Exchanged Data over all Sub-Periods

Period 7: Banking Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		**0.0168**[b] (0.1398)	**0.0000**[a] (0.4302)	**0.0003**[a] (**0.0137**[b])	0.4165 (0.4839)	**0.0000**[a] (**0.0163**[b])	0.0938 (0.5472)	0.7817 (0.3304)	0.1489 (0.1133)
EGY	0.1509 (0.5296)		**0.0330**[b] (**0.0001**[a])	0.2542 (**0.0001**[a])	0.3600 (0.8094)	0.1367 (**0.0040**[a])	**0.0219**[b] (0.1332)	**0.0310**[b] (0.2417)	0.5232 (0.7053)
KEN	0.3201 (0.1551)	0.1155 (0.1803)		0.3961 (0.1065)	0.2282 (0.147)	**0.0012**[a] (0.1158)	0.3133 (0.0548)	0.6901 (0.3007)	0.4881 (0.8213)
MAU	0.8223 (0.1065)	**0.0015**[a] (0.9591)	0.0804 (**0.0059**[a])		0.5377 (0.2033)	**0.0147**[b] (0.0901)	0.2820 (0.1005)	0.2299 (0.7083)	0.9590 (0.1859)
MOR	0.3174 (0.1182)	**0.0434**[b] (0.3281)	0.1691 (0.3585)	0.7953 (0.2361)		0.8422 (0.1009)	0.0829 (0.0619)	0.0921 (0.6734)	**0.0114**[b] (0.8862)
NIG	0.2984 (0.0644)	0.5108 (0.4934)	**0.0092**[a] (0.9663)	0.9347 (0.0888)	0.5671 (0.2317)		0.7996 (0.8765)	0.1362 (0.1447)	0.8824 (0.3269)
SAF	0.4736 (0.1915)	**0.0000**[a] (**0.0173**[b])	**0.0000**[a] (**0.0002**[a])	**0.0171**[b] (**0.0008**[a])	0.4174 (0.0781)	**0.0112**[b] (0.7822)		0.7935 (0.8887)	**0.0242**[b] (0.2249)
TUN	0.7233 (**0.0418**[b])	0.1341 (0.7764)	0.2422 (**0.0343**[b])	0.3114 (0.3274)	0.2530 (0.9316)	**0.0116**[b] (0.4886)	0.1732 (0.0521)		0.3437 (0.1523)
UK	0.8039 (0.8540)	**0.0000**[a] (**0.0001**[a])	**0.0000**[a] (**0.0005**[a])	**0.0000**[a] (**0.0000**[a])	0.3712 (0.1666)	**0.0000**[a] (**0.0348**[b])	0.1928 (0.1848)	0.6248 (0.0554)	

Note: This table reports the Sterling converted results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependent or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

The Dot Com Crisis

The pre, during and post-Dot Com are reported by sub-periods three, four and five respectively.[131] As noted in the previous section, sub-period three the post-Asian/pre-Dot Com crisis period saw very few causal links between the African markets themselves. Analysis of sub-period four, the crisis period itself, also generates a limited number of

[131]The results for sub-period three (01/01/1999 – 10/03/2000) cover two separate crisis periods, the post-Asian crisis and the pre-Dot Com crisis, and as such should be interpreted with caution, as the relationships between the markets could be a result of the previous Asian crisis and may not be a true reflection of the pre-Dot Com period.

causal relationships amongst the African markets. On a daily testing basis, Mauritius is shown to have a leading effect upon Nigeria while Kenya causes South Africa. With the weekly data, South Africa causes both Egypt and Tunisia, while Tunisia causes Kenya. One feature of the results during the crisis period is that UK became influential. Taking both daily and weekly data together, the UK is now shown to Granger cause all other markets within the sample, with the exception of Mauritius. This finding may cast doubt on the ability of the group of markets to offer a UK investor successful diversification during this period. However, the lack of causality between the UK and Mauritius again points to the benefits of including it within an investment portfolio and also support the findings within the cointegration results, where Mauritius is seen to be the most frequently occurring market within the cointegration-free portfolios during this period. Additionally, unlike during the periods surrounding the Asian crisis there are now more relationships between the markets within the weekly testing results compared to the daily testing.

The post-Dot Com crisis period again sees very few causal relationships existing between the African markets themselves. For example, the only causal relationships in sub-period five relate to Egypt, which is shown to lead Botswana, Nigeria which is shown to lead Mauritius and a two-way causal relationship that exists between South Africa and Mauritius (when taking into account both daily and weekly data). Interestingly, the influence of the UK among the African markets falls back after the crisis period itself with the only causal link remaining being with that of Kenya within the daily results. This suggests that any crisis-induced consolidation of developed and African markets is transitory in nature.

The Banking Crisis

The sub-periods six and seven represent the months before and during the global banking crisis respectively. Unlike in the two previous crises, sub-period seven sees a

dramatic change in the pattern of short-term causal relationships. The table reveals that prior to the crisis there are several causal relationships within the sample of African markets. Specifically, South Africa is shown to lead Egypt and Morocco. Kenya and Nigeria are the two African markets which are most affected by their continental partners. Kenya is led by both Egypt and Mauritius, while Nigeria is caused by both Botswana and Mauritius; there is also a two-way causal relationship between both Kenya and Nigeria. Surprisingly, despite the dramatic increase in the number of causal relationships between the African markets, the UK appears to have very little influence and is shown to cause only the two largest of the African markets Egypt and South Africa. As in the earlier periods, there are more causal relationships on the daily testing basis suggesting again that over this testing basis the short-term relationships are stronger, compared to that of the weekly testing basis. More generally, the marked increase in the extent of Granger causality in sub-period six (accounting for both daily and weekly results) relative to those falling earlier might be attributable to recent developments within the African region.

Undoubtedly the most dramatic finding within the Granger results set out in Table 4.9 is the sharp increase in the number of significant causal relationships during the banking crisis. Notwithstanding the recent market developments within Africa, these results suggest that the crisis has had a profound impact on the extent of short-term relationships across the markets in the sample. During the crisis period the UK again becomes relatively influential among the region showing a causal relationship with Egypt, Kenya, Mauritius and Nigeria. Among the African markets the two largest, Egypt and South Africa, and more surprisingly Botswana are among the most dominant.[132] There are some other causal effects from African markets that emerge for the first time during the banking crisis period with Mauritius leading Egypt, Kenya and Nigeria; Tunisia

[132]Egypt leads Kenya, Mauritius, Nigeria, South Africa and Tunisia; South Africa leads Egypt, Kenya, Mauritius, Nigeria and the UK, while Botswana leads Egypt, Kenya, Mauritius and Nigeria.

leading Botswana, Kenya and Nigeria; Morocco leading Egypt and the UK; Kenya leading Nigeria; and Nigeria leading Kenya. Perhaps the most notable effect of the crisis within the African market is however, the number of two-way causal relationships that have developed.

Overall, the results for the banking crisis clearly show that the impact was far more pervasive than that of the two previous crises examined here; this again points to the variability in patterns of causality across different crisis periods, and the need for this heterogeneity to be built into empirical analysis of market linkages. As many of the African markets have become more developed in recent years it is not surprising that the recent banking crisis has had more of an impact on the short-term causal effects among the African markets.[133]

The results from the Granger causality testing over all the seven sub-periods examined are in broad terms, similar to the evidence from the cointegration analysis. For example both sets of findings demonstrate that, in general the UK is weakly related to the African markets and that a UK investor would have the potential to achieve the benefits of diversification through investing into the group of markets. However the results do indicate that, during times of global crisis, as the African markets stock markets have become more developed they have begun to be more influenced by the UK. In particular, it is demonstrated that during sub-periods 4 and 7, the Dot Com and global crisis, the level of causal links from the UK to the various African markets increases significantly. Furthermore, the evidence that short-term relationships are fewer in number than on weekly testing basis is also similar to the results of the cointegration analysis; across all sub-periods, with the exception of three and four, the weekly results of the cointegration analysis also demonstrated that a larger proportion of overall possible combinations are

[133] Although the impact of the recent banking crisis is similar within the local currency data (see Table 4.10A), the pre-crisis period actually exhibits fewer causal relationships on both a weekly and daily testing basis than the Sterling converted tests.

cointegration-free, providing greater potential for a UK investor to create a well-diversified portfolio, suggesting that the relationships between weekly returns are weaker than daily returns.

4.5 Conclusion

This chapter has examined the relationships amongst a number of African markets and the UK, over the fifteen year period 02/01/1996 – 28/10/2010, in order to determine the diversification potential of this group of African markets to a UK investor. In order to examine the long-run relationships between the UK and African markets the chapter examined the extent of cointegration between the markets. Specifically, the analysis investigated the extent of the relationships between every possible combination of African stock markets with the UK to determine potential of these markets to provide a UK investor an avenue for diversification. In addition, the chapter also used Granger causality to investigate the short-tern effects between the group of African stock markets and with the UK. The analysis of both cointegration and Granger causality tests have revealed several key findings regarding the potential for diversification in African stock markets.

First, over the whole period, and each of the sub-periods African markets appear to provide a promising potential for UK investors wishing to diversify their portfolios. Within all periods examined, the results from the cointegration analysis demonstrate that a UK investor could invest in at least five different markets where cointegration is absent. These results are backed up by the findings of the Granger causality analysis, which demonstrates that, with the exception of the Dot Com crisis and the recent banking crisis, the UK generates very few instances of causality with the African markets. Moreover, many of the relationships that the UK and African markets are found to have do not persist over the weekly data based testing periods.

Second, the extent of the relationships between the UK, and the African markets suggest that not only is the extent of integration low enough to suggest that it might not preclude effective diversification, but the pattern is relatively robust and descriptive of all periods since 1996 except the banking crisis. In fact, during the Asian and Dot Com crisis periods, in particular within the weekly testing results, the cointegration analysis reveals that the relationships between the UK and African markets are actually weakened compared to the previous periods, possibly providing a greater opportunity for UK investors to achieve the benefits of diversification. However, following each crisis, the comparable results suggest that the relationships are strengthened slightly. Similar robustness across the crisis periods is demonstrated within the Granger causality analysis, which demonstrates that short-term relationships between the UK and African markets are relatively unaffected by the occurrence of the crisis periods; although the crises have an impact on the short-term relationships at the time, post-crisis they return to close to their former levels. Whilst during the Dot Com and recent banking crisis the number of short-term causal links between the UK and African markets increase markedly, the cointegration testing indicates that 55.12 percent (daily) and 52.76 percent (weekly) during the Dot Com; and 14.12 percent (daily) and 73.33 percent (weekly) during the recent banking crisis, of the total available combinations of markets remain available to a UK investor looking to diversify on the basis of an absence of cointegration.

Third, the type of financial crisis is an important influence on the impact of the short-term relationships between the African markets examined. Although the Asian crisis originated in the developing world, a lack of development among African markets at that time may explain why they were largely shielded from the effects of the crisis. Similarly the limited impact of the Dot Com crisis; caused by the overpricing and subsequent correction in market values of internet businesses might also be seen as a reflection of the developmental state of African markets and an attendant lack of global

integration. However, developments within Africa since the turn of the century have seen increased investment from foreign markets into many of the different economies within the region. Consistent with this change, the recent banking crisis has had a dramatic strengthening impact upon the short-term relationships both amongst the African markets themselves and with the developed market of the UK**.**

Fourth, the strength and patterns of the relationships between the markets is affected by the type of data used in the analysis. In general, results using the more frequent daily testing basis suggest that the extent of relationships amongst the markets is stronger, potentially limiting the potential for effective portfolio diversification. Within the cointegration testing, this finding was the case within all periods, with the exception of period three and four. Within the Granger causality tests, the tendency for daily testing to be associated with more widespread linkages across markets is the case in all periods, with the exception of only sub-period four. This result suggests that although several of the African markets are affected by shocks emanating from the UK market, the effects are short-lived and over the longer-term the relationships between the markets are much weaker. Furthermore the weekly data suggest that market independence is more robust to the effects of the financial crisis periods. In the case of all crisis periods examined the weekly results indicate a weakening of the relationships between the UK and African markets, demonstrating a robustness to the events. In contrast the daily results all indicate the opposite effect with a strengthening of the relationships during each crisis period examined.[134]

Finally whilst this chapter has concentrated on the Sterling converted results, differences between them and the local currency based evidence indicates that the exchange rate is influential on the extent of relationships between the markets. For

[134] The local currency results show similar patterns for both daily and weekly testing towards each of the crisis periods. However in the case of the Asian crisis during sub-period 2 both sets of results indicate a strengthening of the relationships implying a reduction in the benefits of diversification.

example, the local currency cointegration results show stronger relationships during every period examined with the exception of only sub-period three and 4 under the daily testing. However in both cases the results for the local currency are only marginally different than that of the Sterling converted equivalent.

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Chapter Five

An *Ex-Post* Analysis of the Diversification Benefits from Investing in African Emerging Stock Markets

5.1 Introduction

The examination of both the long- and short-term relationships in Chapter 4 have indicated that African stock markets are weakly related to the UK market. This finding suggests that for UK investors the potential for diversification into African markets could be significant. The purpose of this chapter is therefore to examine the risk-adjusted returns available from investing in African emerging stock markets over the period 1996 to 2010. In particular, the aim of this chapter is to examine the mean return per unit of risk (MRPUR) of portfolios consisting of African indices, as well as comparing the performance of these African-only portfolios with a UK-only portfolio and the Morgan Stanley Capital International (MSCI) World Index.[135] To that end, the remainder of the chapter is organised as follows. Section 5.2 provides an overview of the dataset that was obtained for the analysis while Section 5.3 presents a number of descriptive statistics. Section 5.4 outlines the method employed to quantify the gains available from investing in African stock markets over the time periods analysed. The results from performing this analysis are reported in section 5.5. Finally, section 5.6 offers a number of concluding observations.

5.2 Data and Descriptive Statistics

This chapter employs the dataset from Chapter 4 and includes two further African markets, Ghana and the Ivory Coast.[136] However, in order to provide a more complete analysis of the risk-return gains available from investing in African emerging markets, the sub-periods examined differ from those analysed in Chapter 4. Specifically, in order

[135] The MSCI World Index represents 23 developed markets including Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK and the US. Overall 54.90 percent of the overall index is derived from the US market, while the UK, Japan, Canada and France account for 8.77, 8.46, 4.40 and 3.95 percent, respectively. The remaining 19.51 percent is derived from the remaining 18 markets (MSCI, 2014).

[136] These markets were excluded from Chapter 4 as only monthly data was available through Datastream until August 2008, which would have impacted the cointegration analysis. However, this does not have the same impact on the methods employed in this chapter and therefore to provide a more detailed overview of the risk-return benefits of investing in African markets these have been included in the sample.

to analyse the benefits from investing in this group of African emerging stock markets the data was split into 24 different sub-periods to determine the time-varying performance of African stock markets across the 15 year period 1996 to 2010. The different sub-periods examined include the whole 15-year period, 15 one-year periods, five three-year periods and three five-year periods.

All of the market indices were obtained in their local currency and converted to UK pounds Sterling (£) (i) to enable a comparison between the different markets within the sample; (ii) to adopt the perspective of a UK investor; and (iii) to account for the differences in inflation rates between the different markets according to the purchasing power parity theorem. In addition to the currency exchanged analysis, portfolios were also constructed and examined using data expressed in terms of the local currency.[137] In order to carry out the analysis, the returns for each market were calculated using the following formula:

$$R_{it} = \text{Ln} [(P_{it}/P_{it-1}) (X_{t-1}/X_t)] \qquad [5.1]$$

where R_{it} is the return in market i in week t, P_{it} is the price of the market in week t, X_t is the exchange rate for the period and Ln represents the natural logarithm.

A number of descriptive statistics were calculated for the weekly stock market returns for each of the African ESMs along with the UK and MSCI World Index for the full 15-year test period, 1996 to 2010, and for each of the individual sub-periods. In particular, the mean (Mean), the standard deviation (StDev), minimum (Min), maximum (Max), and range (spread) were calculated along with slightly less conventional descriptive statistics such as skewness (Skew), which examines the symmetry of the

[137] The analysis was also conducted using daily data and the results were not qualitatively different from those obtained using weekly data. There are two reasons for choosing to report the Sterling converted weekly data against the local currency weekly data, as opposed to the daily frequency data. First, through taking an investor perspective, the aim of this chapter is to highlight the risk-return benefits through diversification into a group of African emerging stock markets. Therefore, due to the impact of the exchange rate between the UK and the African markets, analysis between both Sterling converted and local currency data, through the perspective of an investor is particularly useful.

return distribution, and kurtosis (Kurt), which examines the distribution of the data around the mean. In addition, the results from applying the Jarque-Bera test for normality to the return series of each market are also reported. The results for the descriptive statistics of the weekly data over the whole period, 1996 to 2010 are reported in Table 5.1.[138]

A number of points emerge from an examination of Table 5.1. First, the weekly returns of each of the African emerging markets varied considerably over the time period examined. For example, the highest weekly return of 0.26 percent was recorded by Egypt; the markets of Ivory Coast and Nigeria also earned high weekly returns of 0.21 and 0.19 percent, respectively. Among the African markets, Ghana had the lowest weekly return of -0.09 percent followed by Kenya (-0.02 percent), with the remaining African markets all recording positive weekly returns. This finding may suggest that Ghana and Kenya would be poor additions to an investment portfolio among these particular African emerging markets. By comparison, the weekly returns of the UK and World Index were relatively low compared to that of most of the African emerging markets considered. In particular, with the exception of Ghana and Kenya, the UK displayed the lowest return of 0.06 percent, followed closely by the World Index of 0.07 percent. This inferior performance among the developed markets in the sample is unsurprising; as noted by Fifield (1999), developed markets on average have tended to display lower returns compared to that of their emerging counterparts.[139]

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[138] The descriptive statistics for the weekly local currency returns over the whole 15-year period 1996 – 2010 are reported in Appendix 5.2 (Table 5.2.1A).

[139] An examination of the local currency weekly returns over the whole 15-year period in Table 5.2.1A reveals similar patterns regarding the performance of the African emerging markets compared to that of the developed markets. Egypt remains the best performer with an average weekly return of 0.33 percent, followed by Nigeria (0.26 percent) and Mauritius (0.22 percent). Perhaps the most striking difference between the Sterling results and the results in local currency is the increased performance of the African markets compared to that of the UK and World Index. In particular, only Kenya, with an average weekly return of 0.03 percent, is lower than that of the UK and World Index. Furthermore, all African markets in the sample recorded weekly returns in local currency that were at least as high as the returns denominated in Sterling. Overall, it appears that African exchange rates depreciated relative to Sterling during the 15-year period considered.

Table 5.1

Descriptive Statistics for Weekly Currency Exchanged Returns: 1996 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0026	0.0430	-0.2026	0.1538	0.3564	-0.4557***	4.8211***	135.13***
GHA	-0.0009	0.0289	-0.1454	0.2065	0.3519	0.4804***	11.3302***	2291.14***
IVC	0.0021	0.0301	-0.1772	0.1764	0.3536	1.1025***	14.1911***	4239.17***
KEN	-0.0002	0.0316	-0.1846	0.2240	0.4086	0.5480***	10.4327***	1839.21***
MAU	0.0015	0.0227	-0.1276	0.1109	0.2385	0.0515	6.0902***	311.49***
MOR	0.0017	0.0264	-0.1999	0.0859	0.2858	-0.6682***	9.4564***	1416.45***
NIG	0.0019	0.0404	-0.2179	0.1778	0.3957	-0.3173***	8.0587***	846.93***
SAF	0.0011	0.0405	-0.2638	0.2167	0.4805	-0.7945***	8.2054***	965.17***
Av AESMs	0.0012	0.0330	-0.1899	0.1690	0.3589			
UK	0.0006	0.0256	-0.1253	0.1669	0.2922	-0.3347***	7.6032***	705.01***
World Index	0.0007	0.0244	-0.1160	0.0944	0.2103	-0.4151***	5.1628***	174.87***

The table shows weekly descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the 15-year period 1996 – 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Second, an examination of the standard deviation figures in Table 5.1 indicates that the majority of the African emerging stock markets were highly volatile. The standard deviation of the weekly returns among the African emerging markets in the sample ranged from a maximum of 4.30 percent within Egypt, to a minimum of 2.27 percent in Mauritius. Furthermore, with the exception of Mauritius, the standard deviation figures for all African markets were higher than that of the UK (2.56 percent) and the World Index (2.44 percent).[140] The variability in stock market returns in the African markets is further demonstrated through the spread in weekly returns over the whole period. Compared to the World Index, all African markets show a higher spread of returns. Similarly, with the exception of Mauritius and Morocco, the spread of returns

[140] Similar patterns were also found within the standard deviations among the local currency results in Table 5.2.1A, where the standard deviations among the African markets ranged from a high of 0.43 percent in Egypt to a low of 0.19 percent in Mauritius.

for each African market is also larger than that of the UK, indicating a wide variability in weekly returns. One feature of the distribution in weekly returns among the African markets is the lower level of minimum return compared to that of the UK and World Index. In particular, the minimum weekly returns for the African markets are all lower than for the UK and the World and range from -1.27 percent in Mauritius to -2.64 in South Africa. This finding supports the view that emerging markets tend to be more volatile compared to more developed markets and that while large gains may be theoretically available for investors, there is also considerable downside risk.

Third, an examination of the descriptive statistics which were calculated over the various sub-periods are shown in Appendix 5.1 (Tables 5.1.1A – 5.1.23A). The tables reveal that the highest return occurred in Egypt during 2005 (2.02 percent), followed by Ivory Coast in 2007 (1.39) and Ghana in 2010 (1.32).[141] The highest weekly return in the UK (World) of 0.43 (0.46) percent occurred during 1997 (1999). By contrast the lowest weekly return among the African markets occurred in Ghana during 2009 (-1.29 percent), followed by Ghana again in 2000 (-1.20) and Nigeria during 2009 (-1.07). The lowest returns for the UK and the World occurred during the one-year periods 2000 – 2002 and 2008, reflecting the impact of the Dot Com crisis and the more recent global credit crisis on the developed markets. In particular, the lowest weekly UK (World) return of -0.73 percent (-0.63 percent) occurred during 2008 (2002). Tables 5.1.1A – 5.1.23A also show that the average return for the African stock markets was greater than that of the UK in 15 of the 23 (65.2 percent) sub-periods and the World Index in 14 of the 23 (60.9 percent) sub-periods. Furthermore, the table show that prior to 2000, both the UK and World Index outperformed African markets on average. However, in more recent years, the average African ESM return has tended to exceed the return recorded by both the UK and the World Index. This finding is promising for investors and suggests that as African

[141] The local currency descriptive statistics for the whole 15-year period and for each of the sub-periods are shown in Appendix 5.2 (Tables 5.2.1A - 5.2.24A).

stock markets have begun to develop they have recorded greater returns compared to that of the more developed markets.

Fourth, of particular importance to a global investor is the impact that the exchange rate has on returns and standard deviations. Over the sample period considered, the exchange rate has had an unfavourable impact. Without exception, African stock market returns denominated in local currency are equal to or higher than their sterling counterparts and, with the exception of Egypt, the standard deviations are lower.[142]

Finally, Table 5.1 shows that the return series of the markets examined are not well approximated by a normal distribution over the period 1996 – 2010; with the exception of Mauritius skewness, kurtosis and Jarque-Bera tests are all significant at the one percent level.[143]

Markowitz (1952) highlighted the risk reduction benefits that can be achieved from adding securities to a portfolio whose return correlations are low or negative. Given the importance of correlations to the diversification argument, Pearson correlation coefficients were calculated for each of the periods examined. In particular, Pearson correlation coefficients were calculated for (i) each pair of African stock markets; and (ii) each African emerging stock market and the UK, and the World Index over the 15-year period 1996 to 2010. The correlation coefficients are shown in Table 5.2.[144] The table also indicates whether the correlation is significantly different from zero at the one, five or ten percent significance level.

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[142] The largest decrease in return occurs in Ghana, where the difference between the local currency return (0.21 percent) and the UK converted return (-0.09 percent) is 0.30 percent, which is unsurprising giving the weakening of the Ghanaian Cedi to sterling indicated in Chapter 2. The markets which show the greatest increase in standard deviation when converted to UK Sterling are South Africa, Kenya and Nigeria, whose standard deviations increased by 0.84, 0.53 and 0.53 percent respectively. Furthermore, taking an average across the 15: 1-year, 5: 3-year and 3: 5-year sub-periods, the UK converted data generally has lower average weekly returns and higher standard deviations.

[143] However, over some of the sub-periods examined, the developed markets and several of the larger African markets fail to reject normality.

[144] The Pearson Correlation coefficients for the sub-periods for sterling returns are displayed in Appendix 5.3 (Tables 5.3.1A - 5.3.23A), while the local currency return correlation coefficients are shown in Appendix 5.4 (Tables 5.4.1A - 5.4.24A).

Table 5.2: Currency Exchanged Correlation Coefficients of Market Returns: 1996 – 2010

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.085**	1.000								
IVC	0.091**	0.170***	1.000							
KEN	0.158***	0.136***	0.080**	1.000						
MAU	0.238***	0.178***	0.119***	0.243***	1.000					
MOR	0.201***	0.083**	0.184***	0.120***	0.162***	1.000				
NIG	0.084**	0.097***	0.068*	0.071**	0.244***	0.137***	1.000			
SAF	0.262***	0.030	0.077**	0.135***	0.091**	0.144***	0.057	1.000		
UK	0.211***	-0.007	0.046	0.136***	0.123***	0.095***	0.024	0.611***	1.000	
World Index	0.274***	0.103***	0.106***	0.169***	0.231***	0.173***	0.101***	0.620***	0.830***	1.000

The table shows the weekly Sterling converted Pearson correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the 15-year period 1996-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

An examination of Table 5.2 shows that the return correlations between the African emerging markets in the sample are extremely low. Specifically, the highest return correlation between the African markets is 0.262, between South Africa and Egypt. The majority of the remaining return correlations between other African markets are some way below this value. The lowest return correlation of 0.057 is between South Africa and Nigeria. By contrast, the return correlations between the UK and the world index is much higher at 0.830.[145] This result supports the findings of Fifield (1999), who also found that emerging markets display much lower correlations compared to those between developed markets. A more detailed examination of the table reveals that the highest correlations are between the UK, the World Index and South Africa. The high return correlations between the developed markets and South Africa reflects the fact that South Africa is the most developed of the African markets in the sample, and in certain definitions, excluded from the emerging market category (Fifield, 1999). One important feature shown in the table, with regard to the potential of the African markets to provide diversification benefits to global investors, is the low return correlations between developed and African emerging markets. That is, the return correlations between the UK and African markets (excluding South Africa and Egypt) are low. For example, the correlation between the UK and Ghana is the lowest in the sample and is negative at -0.007. The second lowest correlation of 0.024 is between the UK and Nigeria.[146]

The return correlations across the various sub-periods examined are shown in Appendix 5.3 (Tables 5.3.1A - 5.3.23A). An examination of these tables reinforces the initial observation that the return correlations among the African markets and with UK

[145] This result is perhaps to be expected as 54.90 percent of the overall World Index consists of the US market and 8.77 percent is derived from the UK (MSCI, 2014).

[146] Although similar patterns exist for the local currency returns over the 15 year period in Table 5.4.1A, the level of correlation between the African markets and between the African markets and the UK and World Index are generally lower. For example, the highest African currency exchanged return correlation was between South Africa and Egypt (0.262). Within the local currency data the correlation between these two markets slightly less (0.250). The largest difference in return correlation is between Mauritius and Ghana, which reduced from 0.178 in the currency exchanged returns to 0.019 in local currency, a drop of 0.159.

and the World are low. For example, during 1996 to 2010, the average return correlation between the African emerging stock markets is 0.151, compared to an average of 0.813 between the UK and World Index. However, combining the UK and World index with the African emerging markets, the return correlations dramatically reduce to corresponding averages of just 0.144 between the UK and African markets, and 0.233 between the World Index and African markets.[147] These low correlation values suggest that African emerging stock markets may play a critical role in reducing the risk of international investment portfolios. Furthermore, the lower average correlation between the UK and African stock markets compared with the World Index and African stock markets occurs in 14 of the 15 single year periods. This implies that greater portfolio risk reduction can be achieved by UK investors who invest in a portfolio consisting of UK and African markets rather than one which includes a mix of African and other developed markets. In addition, the return correlations between the African markets with the UK and the World Index show no apparent increases over the period. Therefore the potential for African markets to provide diversification benefits to both UK and global investors may continue into the foreseeable future.

Table 5.3 shows the MRPUR for each of the 12 sample markets, over the whole 15-year period and each of the sub-periods examined. The MRPUR is the ratio of the mean return to the standard deviation of returns and indicates the return gained for each unit of risk taken. The table also shows the rank of the MRPUR for each market within the various period examined. The country with the highest MRPUR is ranked one and the country with the lowest MRPUR is ranked thirteen; the rankings for each are shown

[147] Tables' 5.4.1A - 5.4.24A show that the correlation coefficients between the returns denominated in local currency are lower than the currency exchanged correlations. For example, the average return correlation between the African emerging stock markets during 1996 to 2010 is 0.045, and the average correlation between the UK and World Index is 0.791. Combining the African markets with the UK and then with the World Index again dramatically reduces the level of return correlations to 0.102 and 0.110 respectively.

in parenthesis. [148] An examination of Table 5.3 clearly shows the variability in the MRPUR ratios over the whole 15-year test period; the ratio ranges from a high of 0.0700 for the Ivory Coast to a low of -0.0294 for Ghana. In terms of the sub-periods, the highest MRPUR of 0.5077 is recorded by Nigeria in 1996, followed by 0.4562 in Botswana in 2005. By contrast the lowest MRPUR ratios are recorded for Ghana in 2002 (-0.1828) and 2009 (-0.3642), followed by Kenya in 1999 (-0.3349). This relatively poor MRPUR performance of Ghana and Kenya is unsurprising given that these markets recorded the lowest average weekly returns across the sample markets. Furthermore, as indicated in Chapter 2, the Ghanaian Cedi recorded the greatest weakening against the sterling during 1996 to 2010, explaining its poor performance in the currency exchanged results. This is confirmed by examining the local currency results in Appendix 5.5. Ghana is ranked lower (higher MRPUR) in nearly every period compared to the currency exchanged results, including the whole 15 year period, where it is ranked second compared to tenth in the sterling results. Finally, it appears that MRPUR ratios are higher over shorter time periods. For example, the average MRPUR across all the group of African markets over all the one-year test periods is 0.0906 as compared to 0.0830 across both the three-year and five-year periods, and 0.0713 across the 15-year period. This finding suggests that the risk-return benefits within the group of African markets are higher for investors with short-term investment horizons.

A closer inspection of the table also reveals the variability in MRPUR across the markets in the different sub-periods examined. For instance, across the three-year periods Botswana is ranked 12th with an MRPUR of -0.0609 in 2002-2004.

[148] The corresponding local currency MRPUR figures for the individual markets over the whole period and each of the sub-periods examined are shown in Appendix 5.5 (Table 5.5A).

Table 5.3
Weekly Currency Exchanged Mean Return Per Unit of Risk (MRPUR) Ratios for Each Stock Market Index Over Various Time Periods

Periods		Index											
		BOT	**EGY**	**GHA**	**IVC**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**	**World Index**
15 Year	**1996 - 2010**	n/a	0.0607 (4)	-0.0294 (10)	0.0700 (1)	-0.0076 (9)	0.0682 (2)	0.0661 (3)	0.0471 (5)	0.0272 (7)	n/a	0.0244 (8)	0.0293 (6)
One Year Periods	**1996**	n/a	0.2368 (3)	-0.1864 (8)	-0.0122 (6)	-0.2483 (10)	-0.1554 (7)	0.2745 (2)	0.5077 (1)	-0.2025 (9)	n/a	0.1459 (4)	0.0147 (5)
	1997	n/a	0.1065 (4)	-0.2795 (10)	-0.0648 (9)	-0.0537 (8)	0.0233 (5)	0.2492 (1)	-0.0102 (6)	-0.0337 (7)	n/a	0.1850 (2)	0.1328 (3)
	1998	n/a	-0.3048 (10)	0.0281 (4)	0.0139 (6)	-0.0475 (7)	0.0269 (5)	0.1827 (1)	-0.3203 (11)	-0.1152 (9)	-0.0947 (8)	0.0908 (3)	0.1174 (2)
	1999	n/a	0.2890 (1)	-0.2885 (10)	-0.1472 (9)	-0.3349 (11)	-0.0335 (6)	-0.1311 (8)	-0.039 (7)	0.2589 (2)	0.1561 (4)	0.1098 (5)	0.1929 (3)
	2000	n/a	-0.1828 (9)	-0.4572 (11)	0.0663 (3)	-0.2738 (10)	-0.1518 (8)	-0.1429 (7)	0.2467 (1)	-0.0683 (5)	0.1647 (2)	-0.0908 (6)	-0.0549 (4)
	2001	n/a	-0.2854 (10)	0.0711 (2)	-0.1147 (5)	-0.2777 (9)	-0.2879 (11)	-0.1222 (7)	0.129 (1)	-0.1133 (4)	-0.2009 (8)	-0.1095 (3)	-0.1210 (6)
	2002	-0.1194 (8)	-0.0905 (7)	0.0765 (3)	0.1172 (1)	-0.0684 (6)	0.1115 (2)	-0.1921 (11)	-0.0644 (5)	0.0577 (4)	-0.1977 (12)	-0.1399 (9)	-0.1683 (10)
	2003	-0.1508 (12)	0.2170 (5)	0.2641 (2)	-0.0299 (11)	0.2357 (4)	0.3120 (1)	0.2387 (3)	0.1436 (7)	0.1753 (6)	0.1217 (9)	0.0970 (10)	0.1218 (8)
	2004	0.0965 (7)	0.3663 (1)	0.1306 (4)	0.1497 (3)	-0.0164 (12)	0.1110 (5)	0.0699 (8)	0.0583 (9)	0.1963 (2)	-0.0099 (11)	0.0990 (6)	0.0484 (10)
	2005	0.4562 (1)	0.4226 (2)	-0.1881 (12)	0.1681 (11)	0.4086 (3)	0.1832 (10)	0.2577 (7)	0.2028 (9)	0.2400 (8)	0.2702 (4)	0.2681 (6)	0.2701 (5)
	2006	0.4434 (1)	0.0057 (11)	-0.0685 (12)	0.1949 (4)	0.2017 (3)	0.1591 (6)	0.1602 (5)	0.1305 (7)	0.0082 (10)	0.3820 (2)	0.1232 (8)	0.0389 (9)
	2007	0.3016 (5)	0.3100 (4)	0.2079 (7)	0.3882 (1)	0.035 (12)	0.3742 (3)	0.2226 (6)	0.3756 (2)	0.0712 (10)	0.1817 (8)	0.0494 (11)	0.0766 (9)
	2008	0.1029 (4)	-0.1466 (11)	0.1630 (2)	0.1028 (5)	-0.1146 (8)	-0.1132 (7)	0.1399 (3)	-0.1384 (10)	-0.0598 (6)	0.3049 (1)	-0.1803 (12)	-0.1339 (9)
	2009	-0.0616 (7)	0.0849 (6)	-0.3642 (12)	-0.1864 (11)	-0.0666 (8)	0.1594 (2)	-0.1014 (9)	-0.1578 (10)	0.1396 (3)	0.2704 (1)	0.1351 (4)	0.1122 (5)
	2010	-0.0825 (12)	0.0544 (11)	0.3387 (1)	0.1726 (4)	0.2417 (2)	0.1840 (3)	0.0994 (9)	0.1334 (7)	0.1710 (5)	0.1422 (6)	0.0717 (10)	0.1021 (8)
Three Year Periods	**1996 - 1998**	n/a	0.0280 (4)	-0.1308 (10)	-0.0205 (6)	-0.0847 (8)	-0.0326 (7)	0.2282 (1)	0.0049 (5)	-0.1041 (9)	n/a	0.1293 (2)	0.0988 (3)
	1999 - 2001	n/a	-0.0652 (7)	-0.2447 (10)	-0.0402 (6)	-0.2973 (11)	-0.1423 (9)	-0.1303 (8)	0.1159 (1)	0.0229 (3)	0.0629 (2)	-0.0347 (5)	0.0003 (4)
	2002 - 2004	-0.0609 (12)	0.1741 (2)	0.1487 (3)	0.0992 (5)	0.0910 (6)	0.1884 (1)	0.0306 (8)	0.0555 (7)	0.1302 (4)	-0.0195 (10)	-0.0178 (9)	-0.0287 (11)
	2005 - 2007	0.3909 (1)	0.2106 (6)	-0.0523 (12)	0.2587 (3)	0.1774 (8)	0.2436 (4)	0.1848 (7)	0.2417 (5)	0.0908 (11)	0.2737 (2)	0.1281 (9)	0.1198 (10)
	2008 - 2010	-0.0075 (8)	-0.0204 (10)	0.0446 (4)	0.0343 (5)	-0.032 (11)	0.0511 (3)	0.0283 (6)	-0.0904 (12)	0.0527 (2)	0.2476 (1)	-0.0144 (9)	0.0067 (7)
Five Year Periods	**1996 - 2000**	n/a	0.0254 (5)	-0.2146 (10)	-0.0165 (6)	-0.1552 (9)	-0.0513 (8)	0.0748 (3)	0.0608 (4)	-0.0387 (7)	n/a	0.0817 (2)	0.0878 (1)
	2001 - 2005	n/a	0.1380 (1)	0.0652 (7)	0.0808 (6)	0.0831 (5)	0.1088 (2)	0.0226 (8)	0.0965 (3)	0.0921 (4)	-0.0055 (9)	-0.0132 (10)	-0.0165 (11)
	2006 - 2010	0.1257 (4)	0.0244 (8)	0.0501 (6)	0.1530 (2)	0.0106 (10)	0.1280 (3)	0.0933 (5)	0.0032 (12)	0.0478 (7)	0.2557 (1)	0.0097 (11)	0.0206 (9)

The table details the weekly Sterling converted Mean Return per Unit of Risk (MRPUR) ratios of each sample stock market in each test period. The mean is calculated as the equally-weighted average while risk is calculated as standard deviation. The ranking of each country for each of the test periods is shown in parentheses.

However, in the following period it is ranked 1st with an MRPUR of 0.3909, before moving down to 8th place in the final three-year test period with an MRPUR of -0.0075. This variability in MRPUR is apparent across many of the longer sub-periods and suggests that investors may find it difficult to identify optimal portfolios from one period to the next. However, the table indicates that there is less variability across shorter timespans. For example, for the one-year test periods Morocco is ranked 1st in 1997 and 1998 (MRPUR of 0.2492 and 0.1827 respectively), Botswana is ranked 1st in 2005 and 2006 (MRPUR of 0.4562 and 0.4434), while Ghana is ranked 12th in 2005 and 2006 (MRPUR -0.1881 and -0.0685).[149] Notwithstanding this, the majority of the African emerging markets considered display wide variability in MRPUR across the different test periods which can be attributed to the high levels of volatility recorded from period to period. This variability in the level of MRPUR is not uncommon in emerging stock markets. Similar levels of variability in MRPUR across periods was highlighted by Fifield et al. (1999) over a large cross section of emerging stock markets and Middleton et al. (2008) surrounding Central and Eastern European markets.

The UK and World Index also showed variation in their MRPUR ratio across the periods examined. Specifically, the largest MRPUR ratios of 0.2681 and 0.2701 for the UK and World Index, respectively occurred during 2005 while the lowest for the UK (-0.1803) occurred during the 2008 global crisis and the lowest for the World Index (-0.1683) towards the end of the Dot Com crisis in 2002. Of particular importance for global investors is the performance of the African markets during periods of economic instability. For instance, during the periods 2000 – 2002 and 2008,[150] the results indicate

[149] Other instances where markets record the same rank of MRPUR within the one-year test periods are Kenya during 2005-2006 and again in 2008-2009; Mauritius during 1997-1998, Morocco during 1997-1998, 2000-2001 and in 2009-2010; Nigeria during 2000-2001, 2004-2005 and 2008-2009; South Africa in 2000-2001 and 2006-2007; and finally Tunisia in 2008-2009.

[150] During 2000 – 2002 and 2008 the MRPUR for the UK market was -0.0908, -0.1095, -0.1399 and -0.1803, respectively, while the MRPUR figures for the World Index were -0.0549,-0.1210, -0.1683 and -0.1339, respectively.

that many African markets offered high MRPUR ratios. For instance, during 2000 (2001), Nigeria, Tunisia and the Ivory Coast (Nigeria and Ghana) recorded higher MRPUR ratios as compared to the UK and the World. In addition, during 2002, only Tunisia and Morocco displayed a lower MRPUR ratio as compared to that of the UK and World Index. During the global downturn in 2008, when the UK MRPUR was at its lowest (-0.1803) and the World Index it's second lowest (-0.1339), the African markets of Tunisia, Ghana, Morocco, Botswana and the Ivory Coast, all recorded positive MRPUR's, ranging from 0.3049 in Tunisia to 0.1028 in the Ivory Coast. Furthermore, a majority of the African markets performed better in terms of MRPUR than the UK and the World in most sub-periods. For example, the average rank for the UK and World Index across all sub-periods is 6.78 and 6.61. Only Kenya (7.87) and Ghana (7.04) are ranked higher on average. Overall Mauritius had the lowest average rank of 5.13, followed closely by Tunisia (5.32) and Ivory Coast (5.57).[151]

Overall, the results from Table 5.3 indicate that the MRPUR ratios of the African markets are generally higher than the corresponding ratios for the UK and World Index. Furthermore, during some periods of global economic uncertainty many of the African markets outperformed their developed counterparts, thus indicating that, during the period examined, African markets may provide a promising investment opportunity for UK and global investors.

5.3 Method

In order to investigate the potential benefits from investing in African emerging stock markets portfolios of African markets were constructed for the whole 15-year period and each of the one-, three- and five-year sub-periods. The MRPUR of these

[151] The exchange rates of the African markets had a negative impact on the MRPUR as many of the local currency MRPUR ratios were greater. For example, across all African markets and test periods considered, the level of MRPUR was greater in the local currency testing in 64 percent of the occasions. The largest impact occurred in Ghana during 2000, where the MRPUR decreased from 0.0474, in local currency returns, to -0.4572 in currency exchanged returns.

African portfolios was then compared to that of the UK and the World Index. The MRPUR of the portfolios was estimated by the ratio of the mean portfolio return by its standard deviation. The mean portfolio return was calculated using the following formula:

$$R_p = \sum_{i=1}^{N} X_i R_i \qquad [5.2]$$

where R_p is the return on the portfolio, X_i is the proportion of the portfolio invested in stock market i, and R_i is the return on stock market i. Similarly, the standard deviation of a portfolio return was calculated as:

$$S_p = \sqrt{\left(\sum_{j=1}^{N} X_j^2 \sigma_j^2 + \sum_{k=1}^{N} \sum_{k \neq j}^{N} X_j X_k \sigma_{jk}\right)} \qquad [5.3]$$

Where S_p is the standard deviation of the portfolio, X_j and X_k is the percentage of the portfolio invested in indices j and k, respectively, σ^2_j is the variance of index j, and σ_{jk} is the covariance between indices j and k.[152]

During each testing period, the optimal MRPUR (highest MRPUR) portfolios were identified through an iterative process, in which the best African index (highest MRPUR) was initially chosen and additional indices were added to the portfolio that resulted in the maximum MRPUR at that stage. This process was continued until all indices within the particular period were included with the portfolio. The number of indices added which resulted in the maximum MRPUR was then taken as the optimum-MRPUR portfolio and compared to that of the UK- and World Index-only portfolios in

[152] In order to construct the MRPUR-optimal portfolios an integer quadratic programming method was employed. More specifically, portfolio weightings were restricted to the discrete values of 0 or 1/k, where k is the number of indices in the portfolio.

order to determine the potential benefits from diversification into the selection of African stock markets.

5.4 The Theoretical Gains Available from Investing in African Emerging Stock Markets

The analysis of the descriptive statistics in Section 5.3 indicated clearly that African markets have the potential to offer investors higher returns with lower levels of risk as compared to that of more developed markets. Furthermore, they were also shown to have lower return correlations as a group and with the UK and the World. These findings suggest that adding an African emerging stock market component to a global investment portfolio could significantly improve overall portfolio performance. However, in order to provide a more formal examination of the benefits available to UK investors through the inclusion of African equities in investment portfolios, the method outlined in the previous section was followed. The results from following this testing procedure are reported in Tables 5.4, 5.5 and 5.6. Specifically, Table 5.4 details the results of the African MRPUR-optimal portfolios for the weekly returns in each test period examined and shows the composition of the optimal portfolios. Table 5.5 shows the MRPUR of the UK and World stock index returns for each of the test periods. The results from testing whether the performance of the African optimal portfolio is significantly better than that of the UK or World stock index returns are also presented in Table 5.5. Table 5.6 summarises the composition and risk-return characteristics of the MRPUR-optimal and *K* country portfolios over the whole 15-year test period 1996 – 2010.[153],[154]

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[153] Although not reported here, a similar analysis was done using daily data. The results from this analysis were not materially different from the findings of the analysis conducted on weekly data which are reported in the text.

[154] A summary of the composition and the risk-return characteristics of the MRPUR-optimal *K* country portfolios, for each of the remaining test periods, both for currency exchanged and local currency tests can be found in Appendix 5.9 (Tables 5.9.1A - 5.9.23A) and 5.10 (Tables 5.10.1A – 5.10.24A) respectively.

An examination of Tables 5.4 and 5.5 reveals that, over the 15-year test period 1996 – 2010, the MRPUR for the optimal African emerging stock market portfolio is much higher than that of the UK- and World Index-only investment portfolios. Specifically, the African emerging stock market portfolio earned an MRPUR over the whole 15-year period of 0.1069, which was over four times greater than that of the UK-only portfolio (0.0244) and over three times greater than the World Index-only (0.0293). Furthermore, the performance of the African portfolio was statistically significantly better than that of the UK- and World Index-only portfolios at the ten percent level. The tables also show that the African portfolio earned a return of 0.20 percent, compared to only 0.06 and 0.07 for the UK- and World-only portfolios, respectively, while the standard deviation of the African only portfolio was 1.86 percent, compared to 2.56 and 2.44 percent, again for the UK- and World-only portfolios.[155] Thus the superior performance of the African market portfolios compared to that of the developed counterparts, can be attributed to both the higher returns and lower standard deviations that they recorded over the 15-year period. Overall, the results suggest that investors can both increase portfolio return and reduce portfolio risk by devoting a portion of their portfolio to the securities of African emerging stock markets. Table 5.4 provides a detailed review of the composition of the optimal African *K*- country portfolios over the 15-year period, 1996 to 2010. The table shows that in order for a UK investor to take full advantage of the benefits from investing in African markets, it is necessary to invest in five African markets.

[155] Similar results are also noted in Appendix 5.6 and 5.7 which report the results from conducting the analysis using local currency returns. As found within the individual African markets the exchange rate appears to have depreciated among the African MRPUR-optimal markets as a group, resulting in increased levels MRPUR-optimal levels expressed in the local currency. For example, the MRPUR of the African-only portfolio in local currency terms is 0.16525, which is nearly 55 percent greater than that of the currency exchanged MRPUR-optimal portfolio over the same period. A closer inspection of the tables reveals that this change in MRPUR can be attributed to both a higher return and lower standard deviation of the African portfolio when viewed in the local currency. Specifically, the return increased by nearly 19 percent to 0.24, while the standard deviation reduced to 1.42, a drop of just over 30 percent as compared to the equivalent currency-exchanged portfolio.

Table 5.4
Currency Exchanged *Ex-Post* MRPUR-Optimal Portfolios for African Emerging Stock Markets in each Period

Periods		African Markets			Number of Markets in Optimal Portfolio	Optimal Portfolio Market Composition	Average MRPUR Across Sub-Period Group
		Return	StDev	MRPUR			
15 Year	**1996 - 2010**	0.00198	0.01855	0.10690	5	IVC, MAU, MOR, EGY, NIG	0.10690
One Year Periods	**1996**	0.00724	0.01425	0.50803	1	NIG	0.37865
	1997	0.00612	0.02458	0.24898	1	MOR	
	1998	0.00355	0.01942	0.18272	1	MOR	
	1999	0.00800	0.02103	0.38032	3	EGY, SAF, TUN	
	2000	0.00705	0.02360	0.29858	2	NIG, TUN	
	2001	0.00354	0.02562	0.13796	2	NIG, GHA	
	2002	0.00276	0.01678	0.16451	2	IVC, MAU	
	2003	0.00788	0.01707	0.46169	5	MAU, MOR, EGY, GHA, KEN	
	2004	0.00880	0.02151	0.40880	2	EGY, SAF	
	2005	0.00789	0.01212	0.65109	7	BOT, EGY, SAF, KEN, MOR, TUN, NIG	
	2006	0.00688	0.01291	0.53270	2	BOT, TUN	
	2007	0.01026	0.01554	0.66052	5	IVC, MAU, NIG, EGY, BOT	
	2008	0.00704	0.02309	0.30490	1	TUN	
	2009	0.00533	0.01971	0.27040	1	TUN	
	2010	0.00632	0.01354	0.46676	4	GHA, KEN, IVC, MAU	
Three Year Periods	**1996 - 1998**	0.00449	0.01968	0.22814	1	MOR	0.27316
	1999 - 2001	0.00305	0.02315	0.13173	2	NIG, TUN	
	2002 - 2004	0.00456	0.01688	0.26992	4	MAU, EGY, SAF, GHA	
	2005 - 2007	0.00577	0.01180	0.48842	7	BOT, TUN, IVC, MAU, NIG, KEN, SAF	
	2008 - 2010	0.00487	0.01967	0.24760	1	TUN	
Five Year Periods	**1996 - 2000**	0.00170	0.02003	0.08487	2	MOR, NIG	0.17948
	2001 - 2005	0.00317	0.01600	0.19787	6	EGY, NIG, SAF, IVC, MAU, KEN	
	2006 - 2010	0.00461	0.01803	0.25570	1	TUN	

The table summarises the risk-return characteristics of the *ex-post* Weekly currency exchanged African MRPUR-optimal portfolios in each test period. In addition, the table details the number and identity of the markets that make up the optimum portfolios. Finally, the table shows the average of the MRPUR-optimal portfolios across each of the sub-periods analysed.

Table 5.5
Currency Exchanged *Ex-Post* MRPUR Portfolios for the UK and World Index in Each Period

Periods		UK			World Index			Average MRPUR Across Sub-Period Group	
		Return	StDev	MRPUR	Return	StDev	MRPUR	UK	World Index
15 Year	**1996 - 2010**	0.00062	0.02558	0.02440*	0.00072	0.02443	0.02931*	0.02440	0.02931
One Year Periods	**1996**	0.00212	0.01453	0.14591**	0.00023	0.01553	0.01468**	0.05696	0.04999
	1997	0.00423	0.02287	0.18496	0.00319	0.02406	0.13280		
	1998	0.00282	0.03107	0.09076	0.00362	0.03086	0.11738		
	1999	0.00261	0.02376	0.10985*	0.00458	0.02372	0.19295		
	2000	-0.00212	0.02334	-0.09083**	-0.00127	0.02312	-0.05486*		
	2001	-0.00315	0.02876	-0.10953	-0.00328	0.02713	-0.12101		
	2002	-0.00515	0.03682	-0.13987*	-0.00631	0.03749	-0.16832**		
	2003	0.00243	0.02506	0.09697**	0.00315	0.02589	0.12182**		
	2004	0.00136	0.01374	0.09898*	0.00083	0.01712	0.04837**		
	2005	0.00296	0.01104	0.26812**	0.00360	0.01334	0.27014***		
	2006	0.00194	0.01575	0.12317**	0.00061	0.01575	0.03893***		
	2007	0.00088	0.01783	0.04936***	0.00128	0.01673	0.07661***		
	2008	-0.00733	0.04065	-0.18032***	-0.00450	0.03357	-0.13390**		
	2009	0.00410	0.03034	0.13514	0.00289	0.02577	0.11220		
	2010	0.00192	0.02679	0.07167**	0.00225	0.02204	0.10211**		
Three Year Periods	**1996 - 1998**	0.00306	0.02366	0.12933	0.00238	0.02407	0.09883	0.03811	0.03941
	1999 - 2001	-0.00088	0.02537	-0.03469*	0.00001	0.02479	0.00034		
	2002 - 2004	-0.00048	0.02702	-0.01776***	-0.00081	0.02828	-0.02869***		
	2005 - 2007	0.00193	0.01507	0.12807***	0.00183	0.01529	0.11984***		
	2008 - 2010	-0.00048	0.03334	-0.0144**	0.00019	0.02762	0.00671**		
Five Year Periods	**1996 - 2000**	0.00193	0.02362	0.08171	0.00209	0.02380	0.08778	0.02607	0.03065
	2001 - 2005	-0.00033	0.02506	-0.01317***	-0.00042	0.02577	-0.01647***		
	2006 - 2010	0.00027	0.02791	0.00967***	0.00049	0.02370	0.02064***		

The table details the currency-exchanged risk-return characteristics of the UK-only and MSCI World Index for each test period. In addition, the table indicates whether the performance of the MRPUR-optimal African portfolio is significantly better than that of the UK-only or the MSCI World Index only in each test period. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level. Finally, the table shows the average MRPUR for the UK-only and MSCI World Index across each of the sub-periods analysed.

In particular, the MRPUR-optimal portfolio consisted of Ivory Coast, Mauritius, Morocco, Egypt and Nigeria.

Table 5.6 provides a breakdown of all the *K*-country portfolios over the whole 15-year period. It shows that investing in a portfolio consisting of any number of the African markets would have outperformed that of the UK- and World-only portfolios in terms of MRPUR. For example, investing in an African portfolio consisting of all eight markets, produced a MRPUR of 0.0763, which outperformed that of the UK-only portfolio by just over three times and the World-only by over two times.[156]

Table 5.6

Currency Exchanged Risk-Return Characteristics of the *Ex-Post* MRPUR – Optimal *K* Country Portfolios: 1996 – 2010

Size	Composition								Return	Standard Deviation	MRPUR
1	IVC								0.00210	0.02995	0.07012
2	IVC	MAU							0.00180	0.01958	0.09193
3	IVC	MAU	MOR						0.00177	0.01720	0.10274
4	IVC	MAU	MOR	EGY					0.00198	0.01872	0.10551
5	IVC	MAU	MOR	EGY	NIG				0.00196	0.01833	0.10690
6	IVC	MAU	MOR	EGY	NIG	SAF			0.00182	0.01806	0.10058
7	IVC	MAU	MOR	EGY	NIG	SAF	KEN		0.00153	0.01717	0.08902
8	IVC	MAU	MOR	EGY	NIG	SAF	KEN	GHA	0.00123	0.01605	0.07632

The table shows the composition and the risk-return characteristics of the Sterling converted weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 15-year period, 1996 - 2010.

The investigation into the possible gains from investing in African stock markets was also conducted for a number of one-, three-, and five-year sub-periods; the results from this testing are shown in Tables 5.4 and 5.5. An examination of the sub-periods reveals several important points regarding the performance of the optimal portfolios.

[156] An examination of Appendix 5.6 (Table 5.6A) reveals similar findings to the analysis using local currency returns. However, the number of markets needed to reap the full benefits of diversification is six, consisting of (Mauritius, Ghana, Morocco, Ivory Coast, Nigeria and Egypt) when the returns are denominated in terms of the local currency.

First, the MRPUR for the optimal African portfolio was never negative. By comparison, the UK- and World-only portfolios displayed negative MRPUR ratios during several of the periods examined.[157] Furthermore, the tables also show the near complete dominance of the African MRPUR-optimal portfolios compared to the UK and World Index. That is, Table 5.4 and 5.5 show that, with the exception of the World-only portfolio during 1996 to 2000, the MRPUR of the optimal African portfolio outperformed the corresponding developed market indices in all periods examined.[158] The largest MRPUR of 0.6605 for the optimal African portfolio occurred in 2007, and is over 13- (0.0494) and 8-times (0.0766) greater than the UK- and World-only portfolios, respectively. The highest MRPUR for the African portfolio compared to that of the UK-only is during 2006 to 2010 (0.2557), where it outperforms the UK by over 26 times (0.0097); and the World-only during 1999 - 2001 (0.1317), where it outperforms the World Index-only by over 383 times (0.0003). Although the largest differences occurred during these particular periods, the extent of outperformance of the emerging markets portfolio is also apparent during most periods considered; the average MRPUR for the African portfolio across all periods examined was 0.3205, as compared to only 0.0478, 0.0445 for the UK and World Index, respectively. Of particular note is the African market performance during periods of global economic crisis. During 2000 – 2002 and 2008, both the UK and World Index recorded a negative MRPUR. By contrast, MRPUR for the African portfolios was 0.2986, 0.1380, 0.1645 and 0.3049, respectively; many of these ratios are statistically significantly greater than their developed market counterparts.[159]

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[157] For example, the UK-only portfolio recorded a negative MRPUR ratio in 2000, 2001, 2002, 2008, 1999 – 2001, 2002 – 2004, 2008 – 2010 and 2001 – 2005. Similarly, the World Index-only portfolio achieved a negative MRPUR in 2000, 2001, 2002, 2008, 2002 – 2004 and 2001 – 2005.

[158] A comparison between Tables 5.6A and 5.7A shows that in local currency returns all of the African MRPUR-optimal portfolios outperformed the corresponding developed market only portfolios.

[159] Specifically, the African MRPUR was significantly greater than the UK-only portfolio in 2000, 2001 and 2008 and statistically significantly greater than the World Index-only in 2000, 2002 and 2008.

Second, the average MRPUR of the optimal portfolios over the sub-periods reinforces the findings from section 5.2 which indicated that, as a group, African markets tend to perform better over single year periods. In particular, the average optimal MRPUR within the one-year sub-periods of 0.3787 is higher than 0.2732 of the three-year sub-periods; 0.1795 of the five-year sub-periods and 0.1069 over the whole 15-year period.[160] This finding suggests that greater benefits are achievable by investing over shorter-term horizons and that investors should consider re-balancing their portfolios on at least a yearly basis to get the best possible gains through investment into African markets. Similar findings surrounding the performance of emerging stock market returns over shorter horizons was also noted by Middleton et al, (2008). Examining the MRPUR of optimal portfolios formed within emerging Central and Eastern European (CEE) stock markets, the results indicated that the largest level of MRPUR was achieved by the optimal portfolios in the one-year sub-periods, with the lowest performing period being the whole period analysed. However, a comparison between the maximum levels of *ex-post* MRPUR achievable in African stock markets with that of the CEE group and other emerging markets, reveals that the level *ex-post* performance in African stock markets is somewhat lower.[161]

Third, the number and composition of African stock markets that make up the optimal portfolios varies across the sub-periods examined. For instance, the average number of markets included in the optimal portfolios is three, and range from a minimum

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[160] As indicated in Chapter 2, many of the African exchange rates depreciated over the period considered leading to lower average MRPUR ratios. An examination of Table 5.6A shows that the average MRPUR ratios are higher in local currency across the one-year (0.5339), three-year (0.3809), five-year (0.2562) and whole 15-year (0.1653) periods.

[161] Specifically, examining the performance of emerging CEE stock markets during 1998 – 2003, the findings from Middleton et al. (2008) revealed that the MRPUR-optimal portfolio over the single year periods ranged from 0.4755 to 2.2230. In contrast, over two-year periods it ranged from 0.3284 to 1.3770, with the lowest level of MRPUR being over the whole six-year period of 0.2410. In addition, examining a large cross-section of 17 emerging stock markets the results highlighted by Fifield et al. (2002) revealed that the single-year optimal-MRPUR ranged from 1.1022 to 2.6346. However, it is important to note that the analysis in both studies was conducted using disaggregated company level data, which due to data restrictions was unavailable in the selection of African stock markets over the time period examined and may explain the difference in the levels of MRPUR achieved.

of one market to a maximum of seven[162],[163]. In addition, none of the African markets appear in every optimum portfolio, highlighting the variability in the MRPUR performance of the African over time. The most frequently occurring markets were Tunisia and Nigeria, which occurred in 56 and 42 percent of the optimal portfolios. By contrast, the least frequent markets were Kenya, Ghana and South Africa, occurring in only 17, 17 and 21 percent of the optimal portfolios, respectively.[164] This variability in the composition of the African optimal portfolio suggests that, in practice, it may be difficult for investors to achieve the full risk-return benefits available. In order to determine if the difference between the occurrences of each African market within the optimal portfolios is statistically significant or simply due to chance, the Chi-Squared goodness-of-fit test was conducted; the results for the test on Sterling returns are shown in Table 5.7.[165],[166] An examination of the table shows that despite there being differences in the composition of the optimal portfolios, the difference is not significant and is simply due to chance; the p-values obtained are greater than 0.1. The lack of statistical significance between the numbers of occurrence in the optimal portfolios indicates a lack of predictability across time among the African stock markets.

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[162] Specifically, the MRPUR-optimum portfolios consisted of one market in 1996 (Nigeria), 1997 and 1998 (Morocco), 2008 and 2009 (Tunisia), 1996 – 1998 (Morocco) and 2006 – 2010 (Tunisia). The MRPUR optimal portfolio that consisted of seven markets was during 2005 (Botswana, Egypt, South Africa, Kenya, Morocco, Tunisia and Nigeria).

[163] The composition of local currency portfolios detailed in Table 5.6A are very different from the Sterling denominated optimal portfolios. Specifically, the MRPUR-optimal portfolio consisted of just one market in five sub-periods 2001, 2008, 2009, 1996-1998 and 2008-2010; and included seven markets 2003, 2005, 2006 and 2005-2007. The increased size and changed composition of the MRPUR-optimal portfolios can be explained by the higher individual MRPUR's within many of the African markets when not exposed to exchange rate risk.

[164] By comparison, within the local currency results the most frequent markets were again Tunisia (61 percent) followed this time by Mauritius (58 percent). The main difference between the currency exchanged and local data is again the impact of the exchange rate on the return in Ghana, which within the local currency results is the third most frequently occurring market, being present in 54 percent of all MRPUR-optimal portfolios.

[165] Specifically, the table details the results of two Chi-Squared tests, the first including all stock markets examined and the second excluding the markets of Botswana and Tunisia, which were not included in all periods examined and thus could impact on the overall Chi-Squared value.

[166] The Chi-Squared goodness-of-fit test for the local currency denominated optimal portfolios are provided in Appendix 5.8 (Table 5.8A).

Table 5.7
Currency Exchanged Chi-Squared Tests for Market Occurrence in Optimal Portfolios Across all Periods Examined

Panel A: Including Botswana and Tunisia				Panel B: Without Botswana and Tunisia			
Market	**Number of Occurrences in Optimal Portfolio**	**Expected Occurrences in Optimal Portfolios**	**Contribution to total Chi-Squared Value**	**Market**	**Number of Occurrences in Optimal Portfolio**	**Expected Occurrences in Optimal Portfolios**	**Contribution to total Chi-Squared Value**
BOT	4	7.300	1.4918				
EGY	10	7.300	0.9986	EGY	10	7.375	0.9343
GHA	4	7.300	1.4918	GHA	4	7.375	1.5445
IVC	7	7.300	0.0123	IVC	7	7.375	0.0191
KEN	4	7.300	1.4918	KEN	4	7.375	1.5445
MAU	9	7.300	0.3959	MAU	9	7.375	0.3581
MOR	9	7.300	0.3959	MOR	9	7.375	0.3581
NIG	11	7.300	1.8753	NIG	11	7.375	1.7818
SAF	5	7.300	0.7247	SAF	5	7.375	0.7648
TUN	10	7.300	0.9986				
Total Chi-Squared Value			9.8767	Total Chi-Squared Value			7.3051
Number of Observed Values – 73 **Degrees of Freedom - 9** **P-Value – 0.361**				**Number of Observed Values - 59** **Degrees of Freedom - 7** **P-Value – 0.398**			

The table shows the Sterling converted results of the Chi-Squared Goodness-of-Fit test based on the number of occurrences of each African market in the optimal portfolios during each period examined. Specifically, the table indicates the number of occurrences of each market in the optimum portfolios, the expected number of occurrences assuming each market occurred in the optimum portfolio equally and the contribution of each market to the overall Chi-Squared statistic based on the difference between the observed and expected occurrences of each market. In addition, the table also shows the degrees of freedom for the test and the resulting p-value. Panel A details the results of the Chi-Squared test including the markets of Botswana and Tunisia, while Panel B excludes both Botswana and Tunisia.

This finding does suggest that investors may find it difficult to obtain the full level of gains available in African stock markets due to none of the African markets occurring statistically more frequently than others. However, the table supports the initial observations regarding Nigeria which appeared in the optimal portfolio more than most other markets and Ghana and Kenya which appeared less often; these markets are the largest contributors towards the overall Chi-Squared statistic.[167]

Finally, an examination of the optimal *K* country African portfolios for each size category reveals that the portfolios constructed recorded a higher MRPUR as compared with the UK- and World Index-only at each stage of the portfolio construction in many of the sub-periods examined.[168] That is, it was not only the optimal portfolio that outperformed that of the UK and World Index, but also any size of portfolio during the particular period. Furthermore, with the exception of the single year period 2009, this was the case in every sub-period examined since 2002. Specifically, over the whole 15 year period; the one-year periods 2002 - 2008 and 2010; the three-year periods 2002 - 2004, 2005 - 2007 and 2008 - 2010; and over the five year periods 2001 - 2005 and 2006 – 2010; a UK investor could have opted for any size of portfolio that consisted of African markets and achieved a greater MRPUR compared to that of the UK or World-only portfolios.[169] This finding indicates that a naïve investment strategy, where an equal

[167] The Chi-Squared tests for the analysis of local currency return data in Table 5.8A reveal that the differences between the numbers of occurrences in the optimal portfolios are also down to chance, with p-values of 0.158 and 0.177. However, as the African markets generally performed better when not exposed to the exchange rate, there are a higher number of occurrences in the optimal portfolio for most markets. The markets that contribute most to the overall Chi-Squared statistic have also changed, the largest being Mauritius which occurs more than expected and South Africa occurring less.

[168] The tables showing the optimal *K*-country portfolios for the currency exchanged and local currency returns across each of the sub-periods examined can be found in Appendix 5.9 and 5.10 respectively.

[169] The local currency results for the *K*-country African portfolios, which are detailed Tables 5.10.1A – 5.10.24A reveal that an investor could have outperformed each of the developed markets by investing in any number of African markets in 15 of the 23 testing periods. Specifically, this occurred during the one-year periods 1996, 2000, 2002 - 2007 and 2010; the three-year periods 1999 – 2001, 2002 – 2004, 2005 – 2007 and 2008 - 2010; and the five year periods 2001 – 2005 and 2006 – 2010.

amount is invested in each available African market could provide greater portfolio returns compared to that of a developed market only investment.

5.5 Conclusion

The purpose of this chapter has been to examine the theoretical risk-return gains available from investing in a cross-section of African emerging stock markets over the period 1996 - 2010. In so doing, the main aim of the chapter has been to quantify the diversification benefits available to a UK or global investor wishing to add an African emerging equity component to their investment portfolio. The analysis conducted clearly indicated that UK and global investors could have achieved substantial diversification benefits from an investment strategy directed at African emerging stock markets over the period 1996 – 2010. Five key findings were highlighted in the chapter.

First, African markets provide an opportunity for global investors wishing to add an African component to their investment portfolios in order to achieve greater risk-return benefits. That is, as a group and across all periods investigated African markets offered investors the potential to increase returns, achieve lower standard deviations and higher MRPUR ratios as compared to that of the more developed stock markets. With the exception of the five-year period 1996 – 2000, the MRPUR of the optimal African portfolios outperformed that of the UK- and World-only portfolios. Furthermore, the MRPUR of the optimal African portfolio was positive in every period examined.

Second, an analysis of the composition of the African optimal portfolios showed that investors can achieve maximum diversification benefits by investing in between one and seven African markets, depending upon the period considered. Although it is not advisable to invest solely in one or two markets, the results of the analysis clearly indicate that devoting a small proportion of an investment portfolio to African markets can improve the overall portfolio performance. In addition, it was shown that in many of the periods examined, an equally-weighted portfolio consisting of any number of African

markets outperformed the UK and World Index, suggesting that a simple naïve investment strategy could obtain many of the gains available.

Third, of particular importance to global investors is the performance of African markets during times of global economic downturn. The analysis of the results showed that during 2000 – 2002 and 2008, when both the UK and World stock market index displayed negative MRPUR ratios as a result of the Dot Com and global crisis, the optimal African portfolio continued to offer UK investors the opportunity to achieve higher portfolio returns. Furthermore, with the exception of 2001, the MRPUR of the optimal African portfolios over these crisis periods were all significantly greater than that of the UK and World Index. Fourth, the results indicated that the performance of the African markets, both individually and as a group, has improved over the sample period as compared to that of the UK and World Index. In particular, with the exception of 2009, the average return of the African markets was greater than that of both the UK and World Index in every single year period since 2000. Similarly the MRPUR ratios of the optimal African portfolios were also significantly larger than that of the UK and World Index, in every sub-period examined since 2001. Furthermore, the evidence from the chapter suggests that this potential is likely to continue into the future as, crucially, over the whole period examined, African return correlations showed no material increase over time.

Finally, the MRPUR of the optimal African portfolios were larger over shorter time horizons. This finding indicates that in order to obtain the full benefits of investing in African markets, investors should rebalance their portfolios on at least a yearly basis. However, it was also noted that the extent of the returns available through investing in African markets may be diminished by exchange rate risk; converting returns to UK Sterling had a negative impact on the overall results for most of the test periods considered.

Overall, the results clearly demonstrate the diversification potential for investors wishing to invest in the emerging stock markets of Africa. However, investors should approach these markets with care as African market returns, variances and covariances fluctuated significantly over time and the composition of the optimal portfolio varied over the test periods considered. As investors are not blessed with perfect foresight this variation may make it very difficult to achieve the full benefits of diversification that this group of African markets has to offer. Furthermore, although within each of the periods examined the African portfolios outperformed that of the UK and World Index, it is important to note that the analysis was conducted on an *ex-post* basis, and as such does not take into account fluctuations in the inputs to the portfolio problem. Thus, the magnitude of the gains documented in this chapter may be difficult to achieve in practice.

Chapter Six

An *Ex-Ante* Analysis of the Diversification Benefits from Investing in African Emerging Stock Markets

6.1 Introduction

The results thus far have suggested that a portfolio consisting of African stock markets offers a UK investor the chance to obtain both higher returns and lower risk as compared to one comprising the UK or World index only. However, as indicated in Chapter 5, returns, variances and covariances fluctuate over time resulting in a change in the composition of the optimal portfolios across periods. Therefore without perfect foresight global investors may find it difficult to achieve the results documented in the *ex-post* analysis. The purpose of this chapter is to provide a more realistic assessment of the gains available from investing in African emerging stock markets. In doing so this chapter seeks to examine various simple forecasting strategies, based on historical data, in order to establish how easily optimal portfolios can be constructed and the extent to which the *ex-post* risk-return gains are achievable in practice. Specifically, this chapter will compare the out-of-sample risk-return gains from various forecasting strategies with those resulting from the *ex-post* analysis in the previous chapter to determine the level of those gains that are achievable on an *ex-ante* basis. In addition, to assess the benefits to a UK investor of constructing such forecasting strategies, the chapter also provides a comparison of the *ex-ante* African portfolios with the UK- and World Index-only portfolios. In order to achieve these aims the chapter will examine the performance of four different forecasting strategies which include: (i) forecasts created through examination of the *ex-post* optimal portfolios identified in Chapter 5; (ii) a simple moving average method to forecast portfolio inputs; (iii) forecasts based on various stock market and economic indicators, coupled with portfolio size selection derived by identifying the optimal mean-variance portfolio during the previous period; and (iv) a 'naïve' *1/N* diversification strategy, where an equal amount is invested in each market.

The remainder of this chapter is structured as follows. Section 6.2 provides a description of the data. Section 6.3 highlights the forecasting models employed in order

to create *ex-ante* portfolios, while Section 6.4 provides an analysis of the risk-return performance of each forecasting strategy. Finally Section 6.5 offers a number of concluding observations.

6.2 Description of the Data

While the data used within this chapter is the same as that used in the previous *ex-post* chapter, there are differences in the composition of the markets used within each of the periods examined. Due to the nature of forecasting many of the *ex-post* optimal portfolios identified in the previous chapter were required to be revisited to account for differences in the number of markets in each period. Specifically, due to the inclusion of Tunisia from 1998 onwards and Botswana from 2002 onwards many of the forecasts included fewer markets than the *ex-post* optimal portfolios in the period where the forecast is implemented. For example, a forecast employed during 1998 will be derived from an examination of the historical data from preceding periods; although the 1998 data covers nine African markets, the earlier periods only included eight. Therefore, in order to provide an unbiased comparison of the *ex-ante* and *ex-post* portfolios, the *ex-post* optimal portfolios were recalculated, where necessary, to include only the number of markets available during the in-sample forecast creation periods. Table 6.1 details the number of markets included within the original *ex-post* optimum portfolios, constructed within the previous chapter, and also indicates where the number of markets included in each of the constructed forecasts differs from that of the original *ex-post* analysis. The table shows that a total of 23 of the forecasts created consisted of fewer markets than the original *ex-post* optimal portfolio. However, as not all *ex-post* optimal portfolios used for comparison contain either Botswana or Tunisia it was only necessary to recalculate the optimal portfolio in a small number of instances.

Table 6.1: Number of Markets Used in Each Forecast

Year	Number of African Markets Included in Ex-Post and Forecast Portfolios				
	***Ex-Post* Optimal Portfolios**	***Ex-Post* Optimal Portfolios in Following Period**	**Three Year Moving Average Forecasts**	**Five Year Moving Average Forecasts**	**Stock Market and Economic Indicator Forecasts**
1996	8	N/A	N/A	N/A	N/A
1997	8	8	N/A	N/A	N/A
1998	9	8	N/A	N/A	8
1999	9	9	8	N/A	8
2000	9	9	8	N/A	9
2001	9	9	9	8	9
2002	10	9	9	8	9
2003	10	10	9	9	9
2004	10	10	9	9	10
2005	10	10	10	9	10
2006	10	10	10	9	10
2007	10	10	10	10	10
2008	10	10	10	10	10
2009	10	10	10	10	10
2010	10	10	10	10	10
1996-1998	8	N/A	N/A	N/A	N/A
1999-2001	9	8	N/A	N/A	N/A
2002-2004	10	9	N/A	N/A	N/A
2005-2007	10	10	N/A	N/A	N/A
2008-2010	10	10	N/A	N/A	N/A
1996-2000	8	N/A	N/A	N/A	N/A
2001-2005	9	8	N/A	N/A	N/A
2006-2010	10	9	N/A	N/A	N/A

This table shows the number of markets included in each forecast period, which corresponds to the number of markets used to calculate the *ex-post* optimal portfolios that are compared with the forecasts. The two left hand columns details the date and the number of markets included in the original *ex-post* testing carried out in Chapter 5, while the remaining columns detail the type of forecast strategy employed and the total number of markets used to create the particular forecast.

Specifically, only during the single year periods 1999, 2000, 2005 and 2006; and the three year periods 1999 – 2001, 2005 – 2007 and 2008 – 2010 was a recalculation of the *ex-post* optimal portfolios necessary, and only where a particular forecast strategy was implemented during that period.[170]

In addition, Table 6.1 also shows the differences in market numbers across the sub-periods examined to which each of the methods of forecasting have been applied. In the case of the *ex-ante* portfolios derived through the previous *ex-post* analysis, the markets contained within all optimal portfolios were applied, where possible, to the proceeding single-, three- or five-year periods. However, where the forecasts were created through further examination of the historical data, the recommended inputs were applied only to the single year period following the forecast.[171] All testing was carried out in local currency and converted to UK pounds Sterling to allow for an examination of the impact of the exchange rate on the forecasted portfolios.

6.3 Method

In order to investigate the achievability of the theoretical gains from diversification into African stock markets, various forecasting strategies were applied. The aim of each strategy is to identify the best combination of in-sample African stock markets, in order to construct an out-of-sample, *ex-ante* portfolio in the following period. Having identified the out-of-sample African stock markets in each portfolio, the returns, standard deviations and mean return per unit of risk (MRPUR) of each were calculated.

[170] Within the local currency test results it was necessary to recalculate the *ex-post* optimal portfolios during the single-year periods 1999, 2000, 2005 and 2006; the three-year periods 1999 – 2001 and 2005 – 2007; and the five-year period 2006 – 2010 where a particular forecast strategy was implemented during that period.

[171] Although not reported here, the *ex-ante* portfolios for each of the methods examined were also applied to the following two- and three-year periods after construction, to allow for comparison of the longer term performance of each of the forecasting methods.

The performance of these *ex-ante* portfolios was then compared to the corresponding *ex-post* optimal, UK- and World Index-only portfolios.

First, in order to determine the usefulness of optimal portfolio identification as an investment strategy for international investors wishing to diversify into African emerging stock markets, the composition of each *ex-post* optimal portfolio identified in the previous chapter was applied to the proceeding period. Specifically, the *ex-post* optimum portfolios were used to construct ex-*ante* portfolios in the one-year periods 1997 – 2010; the three-year periods 1999 - 2001, 2002 - 2004, 2005 - 2007 and 2008 - 2010; and the five-year periods 2001 - 2005 and 2006 - 2010.

Second, following Fifield et al. (1999, 2002), two simple moving average methods were employed to forecast the various inputs to the portfolio problem: (i) means, standard deviations and correlations were forecasted from in-sample data in order to create *ex-ante* portfolios for the following one-year sub-periods; (ii) to establish the importance of accurately forecasting correlations among African markets, forecasts for just the correlation matrices were also created. On this basis *ex-post* means and standard deviations were used to construct the *ex-ante* portfolios

In order to examine the ability of the moving average forecasts containing varying levels of historical data, both three- and five-year moving averages were estimated, producing *ex-ante* portfolios for the single year periods 1999 – 2010 and 2001 – 2010 respectively. Within each variant of moving average forecasts, two methods were used to calculate the *ex-ante* portfolios.

The first estimated means, standard deviations and correlations using a simple equally-weighted moving average, according to the formula:

$$(M_1 + M_2 + M_3)/3 \qquad [6.1]$$

$$(S_1 + S_2 + S_3)/3 \qquad [6.2]$$

$$(V_1 + V_2 + V_3)/3 \qquad [6.3]$$

And

$$(M_1 + M_2 + M_3 + M_4 + M_5)/5 \quad [6.4]$$

$$(S_1 + S_2 + S_3 + S_4 + S_5)/5 \quad [6.5]$$

$$(V_1 + V_2 + V_3 + V_4 + V_5)/5 \quad [6.6]$$

Where M_{1-3} and M_{1-5} represent the means, S_{1-3} and S_{1-5} represent the standard deviations and V_{1-3} and V_{1-5} represent the correlation matrices from the previous three and five one-year sub-periods respectively. The second method differs only in the emphasis placed upon the more recent past, where estimated means, standard deviations and correlations were forecast using an exponentially-weighted moving average, where investors are assumed to place greater importance on the more recent past when constructing portfolio forecasts. The three- and five-year exponentially-weighted moving average forecasts were calculated as follows:

$$(\theta^2 M_1 + \theta M_2 + M_3)/(\theta^2 + \theta + 1) \quad [6.7]$$

$$(\theta^2 S_1 + \theta S_2 + S_3)/(\theta^2 + \theta + 1) \quad [6.8]$$

$$(\theta^2 V_1 + \theta V_2 + V_3)/(\theta^2 + \theta + 1) \quad [6.9]$$

And

$$(\theta^4 M_1 + \theta^3 M_2 + \theta^2 M_3 + \theta M_4 + M_5)/(\theta^4 + \theta^3 + \theta^2 + \theta + 1) \quad [6.10]$$

$$(\theta^4 S_1 + \theta^3 S_2 + \theta^2 S_3 + \theta S_4 + S_5)/(\theta^4 + \theta^3 + \theta^2 + \theta + 1) \quad [6.11]$$

$$(\theta^4 V_1 + \theta^3 V_2 + \theta^2 V_3 + \theta V_4 + V_5)/(\theta^4 + \theta^3 + \theta^2 + \theta + 1) \quad [6.12]$$

Where M_{1-3} and M_{1-5} represent the means, S_{1-3} and S_{1-5} represent the standard deviations and V_{1-3} and V_{1-5} represent the correlation matrices from the previous three and five one-year sub-periods respectively. The θ coefficient takes a value between 0 and 1. In the case where $\theta = 1$, the forecast is equivalent to the equally-weighted forecast described in equations 6.1 to 6.6. Similarly, when $\theta = 0$, the forecast places all emphasis

on the most recent period.[172] Within the exponentially-weighted method seven different values of θ were used to construct the forecasts: 1/8, 2/8, 3/8, 4/8, 5/8, 6/8 and 7/8. The generated forecasts for means, standard deviations and correlations were then used as portfolio inputs and, in-sample MRPUR-optimal portfolios were constructed using the data.[173] The resulting combination of African markets within the in-sample optimal portfolios were then constructed as an *ex-ante* portfolio in the corresponding period in order to establish its performance as a method of forecasting and to allow comparison with the actual MRPUR-optimal portfolio within the forecast period.

Third, *ex-ante* portfolios were constructed using a combined strategy that utilised stock market and economic indicators identified in Chapter 2. That is, African stock markets were ranked on the basis of improvements in stock market and economic indicators during the previous two one-year periods to construct the *ex-ante* portfolio. For example, when selecting African stock markets for the 1998 portfolio, the percentage change in the various indicators during 1996 – 1997 were calculated and ranked with the market showing the most favourable change ranked highest.[174] The indicators examined included Gross Domestic Product (GDP), inflation, foreign direct investment (FDI), stock market capitalisation, stock market turnover and stock market turnover to GDP.[175] The

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[172] In the case where $\theta = 0$, with all emphasis placed on the most recent period, the forecast is simply that of first method of forecasting described within this section, where the composition of the *ex-post* optimal portfolios identified within the previous chapter will be applied to the proceeding period.

[173] Within the three-year moving averages, inputs were generated for all seven exponentially-weighted forecasts and the single equally-weighted. The same number of forecasts were also generated for the five-year moving averages. Both three- and five-year moving averages were also generated using both weighting methods for local currency data. The results of the local currency moving average forecasts can be found in Appendices 6.4 (Tables 6.4.1A – 6.4.4A) for the three-year and Appendices 6.5 (Tables 6.5.1A – 6.5.4A) for the five-year.

[174] When ranking a favourable change within inflation the market that showed the largest reduction over the two year period was ranked highest.

[175] Appendix 6.8 (Table 6.8A) shows the correlation coefficients between the various economic and stock market indicators and returns in each of the African stock markets. The table reveals that many of the correlations are positive suggesting that increases in the various indicators may coincide with increases in stock market returns. In particular, Tunisia is shown to have a statistically significant correlation with each of the indicators examined suggesting that increases in the various fundamentals will likely have the greatest impact on stock returns in this market. However, the table also shows several instances of negative correlation. In particular, several of the African markets display a negative correlation with inflation, indicating that as inflation increases there may be a negative impact on stock returns. In addition, compared to the other African markets Botswana and Nigeria display more instances of a negative correlation indicating that improvements in the indicators in these markets are likely to be less useful for forecasting

ex-post MRPUR-optimal portfolio size within the single year period prior to the forecasting period was used to determine the appropriate number of African stock market indices to be added to the *ex-ante* portfolios. With *ex-ante* portfolios being forecasted for each one-year period during 1998 – 2010 in order to determine which indicators are most useful at predicting future returns.

Finally, in order to provide a benchmark for *ex-ante* portfolio performance, portfolios were created following a naïve *1/N* rule for diversification, where an equal amount was invested in every available market within each time period examined during 1996 - 2010. The benefits of using this strategy as a benchmark for the other indicators are highlighted by DeMiguel et al. (2009), who point out that not only is the *1/N* strategy easy to implement but that, despite advances in sophisticated methods of forecasting portfolio inputs being developed, investors continue to use simple strategies (such as the *1/N* naïve method) when allocating wealth.

6.4 An Analysis of the *Ex-Ante* Gains

6.4.1 Analysis of the *Ex-Post* Optimal Portfolios in the Following Period

As per the discussion in the previous section, the first forecasting strategy involved assessing the performance of the *ex-post* optimal portfolios identified in Chapter 5. In doing so, the composition of the optimal *ex-post* portfolios were used as the portfolio inputs for the following period. Table 6.2 details, for all periods examined, the results of the currency exchanged *ex-post* optimal portfolios.[176] In particular, the table details the period and composition of the *ex-post* optimal portfolios identified in Chapter 5 and also shows the out-of-sample performance of those optimal portfolios when the particular

stock returns. Overall the table suggests that improvements across the various stock market and economic indicators could be useful in describing returns within the various African stock markets.

[176] The corresponding results for the local currency *ex-post* optimum portfolios on an *ex-ante* basis can be found in Appendix 6.1 (Table 6.1A),

Table 6.2: Currency Exchanged *Ex-Post* Optimal Portfolios as Forecasts for Proceeding Periods

Optimal Portfolio from Previous Period		Optimal Portfolio Performance in Following Period				Ex-Post Optimal in Following Period			UK-Only in Following Period	WI-Only in Following Period
Year	**Composition**	**Year**	**Return**	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1996	NIG	**1997**	-0.00023	0.02257	-0.01019	0.00612	0.02458	0.24898*	0.18496	0.13280
1997	MOR	**1998**	0.00355	0.01942	0.18272	0.00355	0.01942	0.18272	0.09076	0.11738
1998	MOR	**1999**	-0.00229	0.01747	-0.13108	0.00800	0.02103	0.38032***	0.10985	0.19295
1999	EGY, SAF, TUN	**2000**	-0.00290	0.02694	-0.10766	0.00705	0.02360	0.29858**	-0.09083	-0.05486
2000	NIG, TUN	**2001**	0.00135	0.02360	0.0572	0.00354	0.02562	0.13796	-0.10953	-0.12101
2001	NIG, GHA	**2002**	0.00015	0.02694	0.00557	0.00276	0.01678	0.16451	-0.13987	-0.16832
2002	IVC, MAU	**2003**	0.00290	0.01348	0.21507	0.00788	0.01707	0.46169	0.09697	0.12182
2003	MAU, MOR, EGY, GHA, KEN	**2004**	0.00406	0.01621	0.25046	0.00880	0.02151	0.40880	0.09898	0.04837
2004	EGY, SAF	**2005**	0.01335	0.02803	0.47632	0.00789	0.01212	0.65109	0.26812	0.27014
2005	BOT, EGY, SAF, KEN, MOR, TUN, NIG	**2006**	0.00427	0.01720	0.24833	0.00688	0.01291	0.53270*	0.12317	0.03893
2006	BOT, TUN	**2007**	0.00435	0.01324	0.32865	0.01026	0.01554	0.66052**	0.04936*	0.07661
2007	IVC, MAU, NIG, EGY, BOT	**2008**	-0.00332	0.02625	-0.12648	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2008	TUN	**2009**	0.00533	0.01971	0.27040	0.00533	0.01971	0.27040	0.13514	0.11220
2009	TUN	**2010**	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
1996 - 1998	MOR	**1999 - 2001**	-0.00304	0.02333	-0.13030	0.00491	0.04240	0.11584**	-0.03469	0.00034
1999 - 2001	NIG, TUN	**2002 - 2004**	0.00090	0.02083	0.04321	0.00456	0.01688	0.26992**	-0.01776	-0.02869
2002 - 2004	MAU, EGY, SAF, GHA	**2005 - 2007**	0.00438	0.01772	0.24692	0.00577	0.01180	0.48842**	0.12807	0.11984
2005 - 2007	BOT, TUN, IVC, MAU, NIG, KEN, SAF	**2008 - 2010**	0.00047	0.01891	0.02494	0.00487	0.01967	0.24760**	-0.01440	0.00671
1996 - 2000	MOR, NIG	**2001 –2005**	0.00210	0.02291	0.09168	0.00317	0.01600	0.19787	-0.01317	-0.01647
2001 - 2005	EGY, NIG, SAF, IVC, MAU, KEN	**2006 - 2010**	0.00203	0.02151	0.09455	0.00461	0.01803	0.25570**	0.00967	0.02064
Cumulative MRPUR During the Single-Year Periods 1997-2010					**1.80152**			**5.16993**	**0.70843**	**0.73522**
Average MRPUR During the Single-Year Periods 1997-2010					**0.12868**			**0.36928*** **	**0.05060**	**0.05252**

This table shows the currency exchanged results of the composition of the *ex-post* optimal portfolios within one period being used as out-of-sample portfolio inputs during the following period. Specifically the two left hand columns detail the periods examined and the composition of the *ex-post* optimal portfolios during that period. The following four columns then show the periods and performance of the resulting *ex-ante* portfolios based on the *ex-post* composition. In order to provide a comparison the remaining sections of the table show the actual *ex-post* optimal performance along with that of the UK- and World index-only portfolios during the forecasted period. In addition, the table reveals the cumulative and average performance during the single year periods 1997-2010, along with the result of a 2-sample t-test for the average performance. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level

composition of African markets are used as the inputs for portfolios in the following period. An examination of Table 6.2 shows that the forecasted portfolios achieved fewer gains during the out-of-sample periods. This result is perhaps unsurprising given the variation in returns, variance and covariance over time and demonstrates that many of the theoretical gains are unavailable in practice. Specifically, with the exception of forecast periods 1998 and 2009 (where the forecast MRPUR achieved the *ex-post* optimal level) the remaining *ex-ante* portfolios recorded a lower MRPUR than the *ex-post* optimal during the corresponding period.[177] The average MRPUR for the *ex-ante* portfolios during 1997 – 2010 was 0.12868, representing only 34 percent of the average achieved by the *ex-post* optimal portfolios over the corresponding periods of 0.36928. Furthermore, the result of a 2-sample t-test revealed that this difference was significant at the one percent level. The highest risk-return ratio occurred during the period 2005 where the forecast portfolio achieved a MRPUR of 0.47632, which was approximately 73 percent of that recorded by the *ex-post* optimal of 0.65109.

In contrast to the performance of the in-sample optimal portfolios, several of the *ex-ante* portfolios record negative MRPUR values, the lowest of which occurred during the forecast period 1999, where the figure was -0.13108.[178] The table also indicates where the levels of MRPUR on the corresponding *ex-post* optimal basis were significantly greater than the *ex-ante* forecast. In total, 12 of the 20 *ex-ante* portfolios recorded MRPUR ratios that were significantly lower than that of the *ex-post* optimal.[179],[180] The

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[177] In both cases, the forecast for 1998 and 2009 only contained one market, Morocco during 1998 and Tunisia in 2009.

[178] In total 5 of the 20 periods generated negative levels of MRPUR including the forecast periods of 1997, 1999, 2000, 2008 and the three-year period 1999 – 2001, where the respective levels of MRPUR were -0.01019, -0.13108, -0.10766, -0.12648, -0.1303.

[179] Of the 12 significantly lower forecast periods only 1999 was significant at the one per cent level, while 2000, 2007, 2008, 1999-2001, 2002-2004, 2005-2007, 2008-2010 and 2006-2010, were all significantly lower at five per cent and 1997, 2006 and 2010 at ten per cent.

[180] An examination of the local currency results in Table 6.1A shows similar patterns to the Sterling results. However, as with the *ex-post* optimal MRPUR ratios, many of the *ex-ante* forecast MRPUR ratios are more extreme, with many periods recording higher negative and positive values than with the currency exchanged results.

extent of the underperformance of the forecast portfolios relative to the *ex-post* optimal becomes apparent when examining the cumulative MRPUR over the one-year periods. For instance, an active global investor implementing this strategy during 1997 – 2010 would have earned a cumulative MRPUR of 1.80152 compared with 5.16990 for the *ex-post* optimal portfolios, which is approximately 285 per cent greater than with the forecast results. Despite this, many of the forecasts examined still produce relatively high levels of MRPUR compared to the UK- and World index-only equivalent portfolios.

A further examination of Table 6.2 shows that the *ex-ante* forecasts are greater than those of the developed market indices in the majority of periods examined. For example, during the forecast periods of 2005, 2007 and 2009 the forecast MRPUR reached 0.47632, 0.32865 and 0.27042 respectively. In contrast the highest ratio among the UK and World index occurred during 2004 with respective ratios of 0.26812 and 0.27014. Importantly, as was the case with the *ex-post* analysis in the previous chapter, the *ex-ante* portfolios continue to outperform the UK and World index in every single year after 2000, suggesting that for a UK investor the out-of-sample performance of the optimal portfolios could still offer a promising investment strategy.[181] The best performing period relative to the developed market indices was 2007, where the MRPUR for the African-based forecast reached 0.32865, compared to only 0.04936, 0.07661 for the UK and World index respectively. In addition, the cumulative MRPUR of the African forecast over the one-year periods is much greater than for the developed market only portfolios over the corresponding periods. Specifically, over all of the one-year periods the cumulative African forecast MRPUR of 1.80152 is approximately 250 and 245 percent greater than the respective figures for the UK and World index of 0.70843 and 0.73522.[182] Notwithstanding this finding the forecast portfolios are only significantly

[181] With the exception of only the one-year periods 1997, 1999 and 2000; and the three-year period 1999 – 2001; the forecast African portfolios consistently outperform the UK and World index only portfolios.
[182]Within Table 6.1A showing the local currency results, the forecast performed better than the currency exchanged forecasts with a total cumulative MRPUR ratio approximately 370 and 330 percent greater than

greater than the UK-only during 2007 at the ten percent level and never significantly greater than the World index-only. Furthermore, it is evident that the forecast performs poorly during periods of global economic downturn relative to the *ex-post* optimal portfolios. Although in the case of the periods covering the Dot Com and global credit crisis the forecast continues to outperform that of the UK and World index, the single year periods 1999, 2001 – 2002 and 2008 are amongst the worst performing of the forecast periods. In each case, the MRPUR of the *ex-ante* portfolio is either negative or close to zero and also represents a sizeable drop in MRPUR compared with the previous period.[183]

6.4.2 Analysis of the Moving Average Forecasts

In order to establish whether a simple method of forecasting portfolio inputs can create a stronger out-of-sample performance than the *ex-post* optimal portfolios from the previous period, a simple moving average method of forecasting returns, standard deviations and correlations was used. Equally weighted moving averages (where equal emphasis was placed on each in-sample period) and exponentially weighted averages (where different weightings were given to the more recent past) were used in the creation of the forecasts. Additionally, both three- and five-year moving average forecasts were conducted in order to examine the benefit of including longer historical periods in the creation of the forecasts. A summary of the results from this analysis are given in Tables 6.3 and 6.4. Table 6.3 shows the average MRPUR for each group of forecasts along with the corresponding average MRPUR for the *ex-post* optimal, UK and World only

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the UK and World index ratios of 0.70843 and 0.78952 respectively. This finding supports the results from the previous chapter and again shows that the exchange rate has a negative impact on both the theoretical and practical gains available through African market investment.

[183] The local currency results, detailed in Table 6.1A reveal several differences in the results over the crisis periods. In particular, the impact of the Dot Com crisis is somewhat lessened within the local currency results with higher MRPUR forecasts of 0.12838 and 0.22649 during 2001 and 2002 respectively. In contrast, an examination of the recent global crisis reveals greater negative values compared to the currency exchanged results which persist into 2009, with a negative MRPUR of -0.31415 in 2008 and -0.35257 during 2009.

portfolios. Table 6.4 shows the results of a paired t-tests examining differences in the weighting variations of each moving average group and also details the difference in the average MRPUR between each weighting, indicating if the difference is significant.[184]

Table 6.3
Average MRPUR for the Currency Exchanged Three- and Five-Year Moving Average Forecasts

	Three Year Moving Average Forecasts			
	Average Forecast MRPUR	Average *Ex-Post* MRPUR	Average UK MRPUR	Average World Index MRPUR
Equally Weighted	0.05826	0.38903***	0.03606	0.04042
Exponentially Weighted (1/8)	0.09697	0.38903***	0.03606	0.04042
Exponentially Weighted (2/8)	0.11111	0.38903***	0.03606	0.04042
Exponentially Weighted (3/8)	0.10857	0.38903***	0.03606	0.04042
Exponentially Weighted (4/8)	0.09545	0.38903***	0.03606	0.04042
Exponentially Weighted (5/8)	0.09748	0.38903***	0.03606	0.04042
Exponentially Weighted (6/8)	0.07543	0.38903***	0.03606	0.04042
Exponentially Weighted (7/8)	0.05037	0.38903***	0.03606	0.04042
	Five Year Moving Average Forecasts			
	Average Forecast MRPUR	Average *Ex-Post* MRPUR	Average UK MRPUR	Average World Index MRPUR
Equally Weighted	0.13030	0.39416***	0.04137	0.03470
Exponentially Weighted (1/8)	0.14726	0.39416***	0.04137	0.03470
Exponentially Weighted (2/8)	0.16423	0.39416***	0.04137	0.03470
Exponentially Weighted (3/8)	0.14610	0.39416***	0.04137	0.03470
Exponentially Weighted (4/8)	0.16135	0.39416***	0.04137	0.03470
Exponentially Weighted (5/8)	0.11701	0.39416***	0.04137	0.03470
Exponentially Weighted (6/8)	0.14651	0.39416***	0.04137	0.03470
Exponentially Weighted (7/8)	0.11841	0.39416***	0.04137	0.03470

This table details the average risk-return ratio for the equally weighted and all exponentially weighted forecasts for both the three- and five-year moving average strategies forecasting all portfolio inputs. In addition, the table also shows the average risk-return ratio for the corresponding *ex-post* optimal, UK- and World index-only portfolios, as well as results of paired t-tests comparing the average *ex-ante* forecast performances with those of the corresponding *ex-post* optimal portfolio. In addition, the results of the two-sample t-tests between the *ex-ante* forecasts and both the UK and World index are documented. An *** indicates significance at the one percent level

An examination of the tables reveal four key findings regarding the performance of the forecasts. First, Table 6.3 shows that, both moving average methods fail to generate

[184] The full breakdown of the results for the Sterling converted equally- and exponentially-weighted three- and five-year moving average forecasts can be found in Appendix 6.2 (Tables 6.2.1A – 6.2.4A) and Appendix 6.3 (Tables 6.3.1A – 6.3.4A) respectively.

many of the *ex-post* gains available. Indeed, the results from the paired t-tests between the average forecast MRPUR and that of the *ex-post* optimal portfolios show that all three- and five-year forecast groups are significantly smaller than their *ex-post* counterparts at the one percent level. The most promising of the forecasts in both the three- and five-year tests was the exponentially weighted 2/8 strategy, which achieve approximately 29 percent (average MRPUR of 0.11111) and 48 percent (average MRPUR = 0.16423) of the respective risk-return gains available. In contrast, the poorest performing forecast was the exponentially weighted (7/8) strategy in the three-year moving average group (average MRPUR = 0.05037) and the exponentially weighted (5/8) strategy in the five-year group (average MRPUR = 0.11701), achieving only 13 and 29 percent of the respective risk-return gains.[185],[186] Despite this relative poor performance, the level of *ex-post* return achieved among the African stock market forecasts compares favourably to that of other emerging markets, suggesting that the returns among African stock markets may be more predictable.[187] Furthermore, when compared with the UK- and World index-only portfolios, the average of the forecasts perform reasonably well. In every case,

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[185] Similar findings resulted with the local currency testing results shown in Appendix 6.4 (Tables 6.4.1A – 6.4.4A, for the three-year tests) and Appendix 6.5 (Tables 6.5.1A – 6.5.4A, for the five-year tests). Within the three-year (five-year) groups it is again the 2/8 weighting that performs best with average risk-return gains of 0.20432 (0.26165), representing only 38 (48) percent of the total risk-return gains of 0.52980 (0.53977) within the average *ex-post* optimal portfolio. In addition, the worst performing group on average was again the 7/8 weighted group with MRPUR levels of 0.12266 (0.17484) representing a total of only 23 (32) percent of the average optimal portfolio level.

[186] Although not reported here, in addition to testing the forecast returns of both three- and five-year moving average forecasts implemented in the following out-of-sample period, testing was also carried out where the forecasted portfolios were implemented in the following two- and three-year periods. For example, a three-year moving average forecast constructed using the periods 1996, 1997 and 1998 was then tested during 1999 – 2000 and then again for 1999 – 2001. This method was conducted for all weightings of forecasts within the three- and five-year groups. The main finding from this analysis was that the further from the point of construction that the forecast was implemented, the less return that it achieved. For instance, the exponentially weighted (2/8) three-year forecast achieved an average risk-return gain across all periods of 0.11111. However when the forecasts were implemented over the following two- and three-year periods from construction, the average returns decreased to 0.0869 and 0.07148 respectively. This was found to be the case in the majority of the longer periods for which the forecasts were implemented, suggesting that the predictive ability of the forecasts quickly diminishes after the point of construction. For a UK investor, this highlights the importance of regularly re-balancing their portfolio within the group of African markets and suggests that a buy-and-hold strategy would produce inefficient results.

[187] For example, following the same method of forecasting *ex-ante* portfolios using a three-year moving average across a large cross-section of 17, non-African emerging stock markets, Fifield et al. (2002) found that the best performing equally-weighted and exponentially-weighted strategy achieved only 9 and 13 percent respectively of the total *ex-post* risk-return gains available.

the average MRPUR of the forecast exceeded the equivalent average for the UK and World only. Within the exponentially-weighted 2/8 group, the forecast for the three- (five-year) moving average was 3.08 and 2.74 (3.97 and 4.73) times greater than the UK-only MRPUR of 0.03606 (0.04137) and 0.04042 (0.03470) in the World index respectively. Further, even the poorest forecast (the three-year moving average 7/8) performed 1.40 and 1.25 times better than the average developed-only portfolio. However, despite this superior performance none of the differences were shown to be significant.[188]

An inspection of the results within the various sub-periods for the three- and five-year moving averages contained in Appendix 6.2 (Tables 6.2.1A – 6.2.4A) and Appendix 6.3 (Tables 6.3.1A – 6.3.4A), respectively, reinforce the impression provided by these findings. Within both the three- and five-year forecasts the exponentially weighted 2/8 portfolios clearly performed best across the periods examined, relative to the *ex-post* optimal portfolios. Specifically, in only six of the periods examined (for the three-year moving average 2/8 group) and three of the periods (for the five-year moving average 2/8 group) did the *ex-post* optimal portfolios record significantly greater levels of MRPUR compared to the forecasts.[189] By comparison, the average *ex-post* optimal MRPUR was significantly greater than the forecast MRPUR for every period in the exponential 7/8

[188] Similar findings are also shown within the local currency results found in Tables 6.4.1A – 6.4.4A and 6.5.1A – 6.5.4A; for both the three- and five-year groups a paired t-test showed that the average risk-return gains within each weighting examined is significantly smaller than that of the corresponding average *ex-post* optimal portfolios at the one percent level. Furthermore, as with the currency exchanged results, all average forecasts are greater than that of the average UK- and World index-only portfolio. However, the two-sample t-tests reveal some differences to the currency exchanged results. Specifically, the average forecast for the 2/8 weighting (within the three-year groups) was shown to be significantly greater than the corresponding UK-only at the ten percent level. In addition, the local currency results reveal that compared to UK and World index, the five-year groups perform better compared with the three-year groups. In particular, the average performance of the 2/8 weighted group is significantly greater than the average of both the UK and World index at the five percent level, while the 3/8, 4/8 and 5/8 weightings are all significantly greater than the UK-only, and the 3/8 and 4/8 groups are also significantly greater than World index at the ten percent level. The statistical significance among the local currency results compared to the Sterling converted suggests that the MRPUR of the forecasts has been negatively impacted by the exchange rate between the UK and the African markets.

[189] Specifically, within the three-year moving average 2/8 group during 1998, 1999, 2006 and 2008-2010 and the five-year 2/8 group during 2007-2010 the *ex-post* optimal MRPUR was significantly greater than the forecast MRPUR.

group and in all but three periods for the exponential 5/8 group, both for the three- and five-year moving averages. Additionally, the forecasts earned a greater MRPUR than the UK and World indices in the majority of periods examined. Only during the early periods spanning 1999 – 2001 (with the three-year moving average tests) and during 2008 (for both the three- and five-year tests) did the UK and World index outperform the forecast portfolios. However, in spite of this strong performance, it was only during 2007 that any of the forecasts significantly outperformed either developed index.[190]

Second, although the forecast performance does not provide overwhelming support for using a moving average method, it does indicate that using more recent historical periods in the creation of the forecast produces superior results. In particular, the finding that the 2/8 and 3/8 are the better performers within the three-year moving average group - and the 7/8 and equally-weighted are among worst - suggests that a strategy of forecasting using inputs from the more recent past is more accurate. This finding is reinforced through an examination of the three-year moving average results in Table 6.4, which reveals that the average MRPUR in exponentially weighted 2/8 and 3/8 forecasts is significantly greater (although only at the ten percent level) than both the 6/8 and 7/8 forecasts. However, this finding is not mirrored within the five-year moving average group. Despite the weightings with a focus more on the recent past earning higher average levels of MRPUR, when compared with the three-year groups there is less variation across weightings and none of the t-tests conducted indicated significant differences.

[190] Within the three-year moving average results only the equally weighted and the exponentially weighted 6/8 and 7/8 failed to significantly outperform the UK and World index during 2007. Likewise, within the five-year moving average groups only the exponentially weighted 5/8 group failed to significantly outperform the UK and World index during the same period.

Table 6.4: Paired T-Tests for the Currency Exchanged Three- and Five-Year Moving Average Forecasts

3 Year Moving Average Paired-T-Tests		Equally Weighted	Exponential Weighted (1/8)	Exponential Weighted (2/8)	Exponential Weighted (3/8)	Exponential Weighted (4/8)	Exponential Weighted (5/8)	Exponential Weighted (6/8)	Exponential Weighted (7/8)
		Table Showing Difference in MRPUR Across Tests							
	Average Forecast MRPUR	**0.05826**	**0.09697**	**0.11111**	**0.10857**	**0.09545**	**0.09748**	**0.07543**	**0.05037**
Equally Weighted	**0.05826**	N/A							
Exponential Weighted (1/8)	**0.09697**	0.0387	N/A						
Exponential Weighted (2/8)	**0.11111**	0.0528	0.0141	N/A					
Exponential Weighted (3/8)	**0.10857**	0.0503	0.0116	-0.0025	N/A				
Exponential Weighted (4/8)	**0.09545**	0.0372	-0.0015	-0.0157	-0.0131	N/A			
Exponential Weighted (5/8)	**0.09748**	0.0392	0.0005	-0.0136	-0.0111	0.002	N/A		
Exponential Weighted (6/8)	**0.07543**	0.0172	-0.0215	-0.0357*	-0.0331*	-0.0200	-0.0221	N/A	
Exponential Weighted (7/8)	**0.05037**	-0.0079	-0.0466	-0.0607*	-0.0582*	-0.0451	-0.0471	-0.0251	N/A
5 Year Moving Average Paired – T-Tests		**Equally Weighted**	**Exponential Weighted (1/8)**	**Exponential Weighted (2/8)**	**Exponential Weighted (3/8)**	**Exponential Weighted (4/8)**	**Exponential Weighted (5/8)**	**Exponential Weighted (6/8)**	**Exponential Weighted (7/8)**
		Table Showing Difference in MRPUR Across Tests							
	Average Forecast MRPUR	**0.13030**	**0.14726**	**0.16423**	**0.14610**	**0.16135**	**0.11701**	**0.14651**	**0.11841**
Equally Weighted	**0.13030**	N/A							
Exponential Weighted (1/8)	**0.14726**	0.0170	N/A						
Exponential Weighted (2/8)	**0.16423**	0.0339	0.0170	N/A					
Exponential Weighted (3/8)	**0.14610**	0.0158	-0.0012	-0.0181	N/A				
Exponential Weighted (4/8)	**0.16135**	0.0310	0.0141	-0.0029	0.0152	N/A			
Exponential Weighted (5/8)	**0.11701**	-0.0133	-0.0303	-0.0472	-0.0291	-0.0443	N/A		
Exponential Weighted (6/8)	**0.14651**	0.0162	-0.0008	-0.0177	0.0004	-0.0148	0.0295	N/A	
Exponential Weighted (7/8)	**0.11841**	-0.0119	-0.0289	-0.0458	-0.0277	-0.0429	0.0014	-0.0281	N/A

This table shows the results of a paired t-test comparing the equally weighted and exponentially weighted forecasts among the three- and five- year moving average groups. Specifically the table indicates the average MRPUR achieved by each of the weighted variations along with differences between the average MRPUR achieved. An * indicates significance at the ten percent level.

Third, an inspection of the three- and five-year moving average forecasts reveals differences in the performance of the two lengths of historical periods used in the construction of the forecasts.[191] Within the three-year results, the best performing period relative to the *ex-post* optimal portfolio was 2005. Within this period, (with the exception of the 7/8 which was the poorest performing weighting), the forecasts achieved approximately 74 percent of the maximum risk-return gains available, with an MRPUR of 0.48252 compared to 0.65109 in the *ex-post* optimal portfolios. Under the five-year test conditions, the maximum performance, relative to the *ex-post* optimal portfolios, occurred during 2001 where all weightings (excluding the equally weighted and the exponential 7/8,) achieved a MRPUR of 0.12908, which was approximately 94 percent of the 0.13796 risk-return gains enjoyed by the *ex-post* optimal portfolios. In comparison the worst performing period within the three-year analysis occurred for the equally weighted and exponentially weighted 7/8 during 2001, where each generated a negative risk-return ratio of -0.20117 compared with 0.13796 for the *ex-post* optimal results. On the five-year basis the worst performance occurred within the exponentially weighted 1/8 group where, during 2009, the forecast earned a negative MRPUR of -0.14776, compared to 0.27040 for the ex-post optimal. The tables reveal some further notable patterns within the results. In particular, within both three- and five-year test groups the results suggest that the performance of the forecasts are impacted by periods of global economic instability. For example, within the three year moving average results all negative forecast results occur during the earlier periods spanning 1998 – 2002 and the later periods 2008 and 2009. This is also the case in the five-year moving average tests where, with the exception of the exponentially weighted 3/8, which also produced a negative MRPUR during 2003, all weightings generated negative values during 2002, 2008 and

[191] The results for the three-year moving average forecasts across each of the sub-periods in which they were implemented can be found in Tables 6.2.1A – 6.2.4A, while the corresponding results for the five-year moving average forecasts are in Tables 6.3.1A – 6.3.4A.

2009. In addition, the best performing period on average in both the three- and five-year analyses was 2003 – 2007. This finding suggests that African markets as a group may not be as shielded from the impacts of global economic downturn as their underdeveloped nature may suggest. However, despite the recent global crisis beginning during 2007, many of the weightings examined actually recorded their best performance relative to the UK and World indices during that period, in many cases generating significantly greater MRPUR's than both of the developed only portfolios by at least ten percent, before recording a negative ratio during 2008. This apparent lag surrounding the impact of the global crisis on the African markets was also noted during the cointegration testing reported in Chapter 4 where, under weekly testing conditions, the relationships between the markets appeared to weaken during the crisis periods and strengthen thereafter.

Finally, a comparison between the predictive ability of both the three- and five-year moving average forecasts can also be obtained through examination of Tables 6.3 and 6.4. Within Table 6.4 the results of the paired t-tests suggest that when shorter historic periods are used within the construction of the forecast, as with the three-year groups, the emphasis placed on more recent data results in significantly higher forecast returns than do those based on less recent periods. However, despite the lack of statistical differences between the weightings in the five-year groups, close inspection of the tables reveals that the level of risk-return gains achieved are greater for the five-year tests. The lowest average MRPUR ratio among the five-year tests of 0.11701, occurring in the exponentially weighted 5/8 group, is actually greater than the corresponding highest MRPUR among the three-year tests of 0.11111 for the 2/8-based strategy. This finding would appear to suggest that the longer are preferable when predicting on the basis of moving averages. Despite this identifiable pattern in the results the two sample t-test indicated that there was no significant difference between the results from either

method.[192] Furthermore, when removing the first two periods from the three-year moving average testing, i.e. those which are not included within the five-year forecasts and which have been shown to produce largely negative MRPUR ratios, the levels of risk-return gains across the forecasts are broadly similar and in some cases (although still not significant) the three-year outperforms that of the five-year moving averages.[193]

In addition to the *ex-ante* strategy that forecasted all portfolio inputs, the moving average method was also used to forecast only the correlation matrix. In this instance actual portfolio returns and standard deviations were used in the construction of the out-of-sample portfolio on the assumption that they can be predicted efficiently and to allow for an examination into the accuracy of correlation forecasting. A summary of the currency exchanged correlation only forecasts for the three-year and five-year moving averages can be found in appendix 6.6 (Tables 6.6.1A – 6.6.4A) and Appendix 6.7 (Tables 6.7.1A – 6.7.4A) respectively. An inspection of the results indicates a sharp contrast with those where all portfolio inputs were forecasted, indeed many of the *ex-ante* tests conducted on both three-and five-year moving average bases achieve the same risk-return gains as the *ex-post* optimal portfolios. Furthermore, none of the forecasted MRPUR figures differ significantly from the *ex-post* optimal portfolios within the individual periods. A comparison between the three- and five-year moving average results suggests that neither method can claim to be more successful than the other; although not reported

[192] Although not reported here, the results of the paired t-tests between the local currency three- and five-year moving average groups indicated that many more of the average MRPUR within the forecasts show a significant difference compared to the Sterling converted equivalents. Specifically, within the three year groups the 2/8 and 3/8 forecasts were shown to be significantly more profitable than the equally weighted, 6/8 and 7/8 forecasts at the one percent level of significance, again suggesting that forecasts with a focus on the more recent past perform better than those based on the more distant past. In addition, the 2/8 weighting significantly outperformed both the 4/8 and 5/8 at the five percent level, while the 4/8 weighted forecast did significantly better than the 7/8 at the one percent level and both the equally weighted and 6/8 at the five percent level. Finally, the 5/8 was shown to be more profitable than the 7/8 at the five percent level. Significance also exists within the five-year group under local currency conditions where the 2/8 (3/8) weighted groups did significantly better than the 5/8 and 6/8 at the five percent level and the 4/8 (5/8 and 6/8) at the ten percent level.

[193] Specifically after removal of 1999 and 2000 from the three-year moving average test groups the respective average risk-return gains within each weighting group from equally weighted to exponential 7/8 are 0.0973, 0.1464, 0.1634, 0.1604, 0.1459, 0.1508, 0.1243 and 0.0910.

here two-sample t-tests were conducted for the different weightings comparing the two lengths of forecasting base and none of the differences were significant. Similar findings were highlighted by Fifield et al. (1999) who found that forecasts of just correlations, created using *ex-post* returns and standard deviations, achieved nearly all of the *ex-post* gains available in the out-of-sample periods. This finding suggests that within the group of African markets studied it is the ability to accurately forecast returns rather than correlations that drives the success of a forecasting strategy.

6.4.3 Analysis of Economic and Stock Market Indicators

Investigation of the achievability of risk-return gains from investing in the selected group of African stock markets was also conducted using various stock market and economic indicators. Table 6.5 details the average performance for each indicator variable used across all sub-periods in which they were implemented and also provides the results of paired t-tests comparing each forecast.[194]

A number of observations can be made from an analysis of the table. First, there was a substantial degree of variation between the average forecasting ability of each indicator. The highest level of risk-return gains were achieved through the portfolios constructed on the basis of turnover ratio with an average MRPUR across all periods of 0.15918. This was followed closely by the value of stock traded as a percentage of GDP and the value of stocks traded in UK pounds, which recorded respective average MRPURs of 0.13815 and 0.11141. In contrast, the remaining indicators performed poorly with stock market capitalisation earning –by some margin- the lowest average MRPUR of only 0.00762.

Second, the results of the paired t-tests found in Table 6.5 that compare the performance of the average indicators revealed that the difference of 0.1516 in MRPURs

[194] The full breakdown of the Sterling converted indicator forecasts detailing their performance in each of the sub-periods examined can be found in Appendix 6.9 (Tables 6.9.1A – 6.9.4A).

Table 6.5: Average MRPUR and Paired T-Tests for Currency Exchange Stock Market and Economic Indicator Variable Forecasts

Stock Market and Economic Indicator Forecasts	Average Forecast MRPUR	Average *Ex-Post* MRPUR	Average UK MRPUR	Average World Index MRPUR
Turnover Ratio	0.15918	0.36973***	0.04027**	0.04634**
Stocks Traded (£)	0.11141	0.36973***	0.04027	0.04634
Stocks Traded as % GDP	0.13815	0.36973***	0.04027	0.04634
Stock Market Capitalisation	0.00762	0.36973***	0.04027	0.04634
Foreign Direct Investment (FDI)	0.03580	0.36973***	0.04027	0.04634
Gross Domestic Product (GDP)	0.05926	0.36973***	0.04027	0.04634
Inflation	0.06375	0.36973***	0.04027	0.04634

Paired-T-Tests for Average Stock Market and Economic Indicator Performance		Turnover Ratio	Stocks Traded (£)	Stocks Traded as % GDP	Stock Market Capitalisation	Foreign Direct Investment	Gross Domestic Product	Inflation
		Table Showing Difference in MRPUR Across Tests						
	Average Forecast MRPUR	**0.15918**	**0.11141**	**0.13815**	**0.00762**	**0.03580**	**0.05926**	**0.06375**
Turnover Ratio	**0.15918**	N/A						
Stocks Traded (£)	**0.11141**	-0.0478	N/A					
Stocks Traded as % GDP	**0.13815**	-0.0210	0.0267	N/A				
Stock Market Capitalisation	**0.00762**	-0.1516**	-0.1038	-0.1305*	N/A			
Foreign Direct Investment (FDI)	**0.03580**	-0.1234*	-0.0756	-0.1023	0.0282	N/A		
Gross Domestic Product (GDP)	**0.05926**	-0.0999*	-0.0522	-0.0789*	0.0516	0.0235	N/A	
Inflation	**0.06375**	-0.0954	-0.0477	-0.0744	0.0561	0.0279	0.0045	N/A

The top section of this table shows the average MRPUR achieved with each method of indicator forecast implemented. The table also shows the average MRPUR for the corresponding *ex-post* optimal, UK- and World index-only portfolios. In addition the table details the results of the paired t-tests comparing the average *ex-ante* indicator forecast performances with that of the corresponding *ex-post* optimal portfolio and in the results of the two-sample t-tests between the *ex-ante* indicator forecasts with that of the UK and World index. The lower section of the table details the difference in MRPUR between the different indicator forecasts and shows the results of a paired t-test between each forecast. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

between turnover ratio and stock market capitalisation was significant at the five percent level, while the differences of 0.1234 and 0.0999 between the turnover ratio and FDI and GDP, respectively, were significant at the ten percent level. The second strongest forecast, stock traded as a percentage of GDP, significantly outperformed those based on stock market capitalisation and GDP at the ten percent level of significance, with differences of 0.1305 and 0.0789 respectively.[195] This result is perhaps unsurprising as it has been suggested in the literature that local market liquidity is a significant driver of expected returns in emerging stock markets (Bekaert et al., 2007). In addition, investors in emerging markets, tend to be concerned with liquidity levels (Middleton et al., 2007). The finding suggests that stock market liquidity, as measured by turnover ratio and stock market significance within an economy are the best indicators of future performance for the group of African markets examined here.

Third, despite the difference in forecasting ability of the various indicators employed, all failed to produce levels of MRPUR comparable to the *ex-post* returns available with each indicator forecast shown to be significantly lower than the *ex-post* optimal portfolio equivalent at the one percent level of significance. Even the best performing indicator, turnover ratio, returned an average of only 43 percent of the total risk-return gains. The worst performing indicator, stock market capitalisation, managed only 2 percent.

Fourth, Table 6.5 reveals a degree of variation between the average performance of the indicator forecasts and the UK- and World index-only portfolios. Unlike the other

[195] The breakdown of the local currency results for the indicator forecasts across each of the sub-periods can be found in Appendix 6.10 (Tables 6.10.1A – 6.10.4A). The results are very similar to the Sterling converted findings with the average performance of each indicator being in the same order, turnover ratio being the best and stock market capitalisation the worst. However, as is the case throughout the empirical work in this thesis, the local currency results are more extreme than the Sterling converted with each indicator producing a higher average forecasted MRPUR than its Sterling converted counterpart. For example, the average turnover ratio MRPUR is 0.20273, which is 0.04355 higher than the comparable Sterling result. However, although not reported here paired-tests, between the Sterling and local currency tests revealed no significant difference in the corresponding results, with the exception of only the GDP forecast, which was shown to be greater under the local currency test conditions to the ten percent level of significance.

methods of forecasting that have thus far been employed, the forecasts based on stock market capitalisation and FDI generated lower average MRPUR than both the UK and World index. While the remaining indicators all achieved a higher average MRPUR than either of the developed indices, only the turnover ratio managed to significantly outperform both the UK and World index at the five percent level. Interestingly of all forecasts examined, this was the only method that achieved a risk-return gain that significantly outperformed either of the developed-only portfolios.[196]

Further investigation into the performance of each indicator forecast was conducted via an examination of the sub-periods in which they were implemented, reported in Appendices 6.9 (Tables 6.9.1A – 6.9.4A). On inspection of the various results, the difference in performance between the various indicators is reinforced. For example, the turnover ratio, the best performing indicator, recorded a negative MRPUR during 2008 of -0.06778. The other better performing indicators, stocks traded in pounds and stocks traded as a percentage of GDP, recorded identical negative values during three periods, 1999, 2002 and 2008, with respective MRPUR values of -0.14702, -0.01084 and -0.01944. By comparison, the remaining indicators recorded negative returns in at least five of the periods spanning 1998 – 2001 plus the later periods 2008 and 2009. Of particular note is the finding that the turnover ratio managed to generate positive levels of return during all of the earlier periods, unlike the remaining indicators or any of the other forecasting strategies examined.

When comparing the performance of the indicators with that of the *ex-post* optimal portfolio across the various sub-periods the evidence suggests that these variables

[196] Within the local currency results similar findings were noted. Despite the results of the local currency being greater in magnitude than the Sterling converted equivalents, the corresponding *ex-post* optimal portfolio also recorded a higher average MRPUR, with all local currency indicators still performing more poorly than the *ex-post* optimal at the one percent significance level. However, compared with the UK- and World index-only portfolios, the local currency results did perform more favourably. Along with the turnover ratio, use of the stocks traded as a percent of GDP was also shown to generate significantly greater MRPUR than both the UK- and World index-only, at the ten percent level.

compare favourably with the other forecast bases investigated. While all indicators fail to deliver gains similar to those achieved by the optimal portfolios, the better performing indicators, such as turnover ratio and stocks traded as a percent of GDP, displayed far fewer instances of an extreme significant difference against the optimal portfolio. For instance, with the turnover ratio forecast, of the thirteen periods examined six were found to have significantly smaller MRPURs than the *ex-post* optimal. However, there were no instances where the difference was significant at the one percent level and in half of the cases significance was only at the ten percent level.[197] In addition, when compared to the UK- and World index-only portfolios, the turnover ratio fails to outperform both only during 1998 and stocks traded as a percent of GDP only during 1998 and 1999. The remaining indicators generate far more instances of portfolio underperformance compared with the developed markets, the worst being stock market capitalisation, which fails to outperform both the UK and World indices during 5 of the 13 periods examined.[198] As with the other methods, despite many forecasts outperforming the UK and World indices, there were very few significant differences. Similar to the moving average forecasts, many of the indicators -with the exception of stock market capitalisation and foreign direct investment- significantly outperform that of the UK and World index during 2007, where the developed markets would have begun to feel the impact of the global crisis. However, in the case of the turnover ratio and surprisingly foreign direct investment, given its relative poor performance compared with other indicators, there is also a significant (at the ten percent level) difference from the World index during 2002,

[197] Within the local currency tests the results are somewhat different to that of the Sterling converted equivalents. Despite the turnover ratio generating the strongest portfolio performance there are more instances of a negative return. In particular, during 1998, 2003 and in 2008 the return recorded for portfolios constructed on the basis of turnover ratio is negative. This finding is apparent across the other indicators where under local currency conditions each saw either the same or a greater number of negative returns being generated across all periods. Furthermore, even in the indicators generating greater MRPUR there are more extreme significant differences between the forecasts and the *ex-post* optimal portfolios. These findings suggest that while the exchange rate impacts the level of return available it may provide some protection against more extreme negative returns.

[198] Specifically, market capitalisation underperforms the UK and World index during 1998 – 2000, 2005 and again in 2009.

where many developed markets would have still been feeling the impact of the Dot Com crisis. Overall, these findings suggest that UK investors wishing to diverse into the group of African stock markets would be wise to consider market liquidity. The findings have demonstrated that not only is turnover ratio, a measure of stock market liquidity, the best performing indicator for predicting future returns, but that forecasts on this basis produce fewer instances of negative return and on average significantly outperform that of the UK and World index.

6.4.4 Analysis of Naïve *1/N* Diversification

In order to assess the relative success of the various forecasting strategies the *1/N* naïve diversification rule was employed as a benchmark. This method involves an equal amount of wealth being placed in each market over the test periods. The results of Sterling converted naïve portfolios are reported in Table 6.6. The table indicates the composition of the portfolios along with the performance of the *ex-ante* naïve and the corresponding *ex-post* optimal portfolios. Table 6.6 also reports the MRPUR for the UK- and World-only portfolios.

An examination of the table reveals that the highest risk-return ratio of 0.55757 occurred during 2007, representing approximately 84 percent of the optimal portfolio MRPUR, significantly outperforming the UK- and World index-only portfolios at the one percent level. However, the highest proportion of available *ex-post* optimal gains achieved by the naïve strategy occurred during 2003 where the MRPUR of 0.39290 represented 85 percent of the 0.46169 MRPUR generated by the *ex-post* optimal portfolio. Further examination of the table reveals that unlike the other forecasting methods investigated, where the naïve strategy produced a positive MRPUR (with the exception of 1999 - MRPUR 0.03023) the performance was never significantly smaller than that of the corresponding *ex-post* optimal portfolio.

Table 6.6: Currency Exchanged – Naïve *1/N* Diversification Strategy

Year of Forecast	All Markets Available in Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1996	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF	-0.00037	0.01104	-0.03364	0.00724	0.01425	0.50803***	0.14591	0.01468
1997	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF	-0.00011	0.01860	-0.00612	0.00612	0.02458	0.24898	0.18496	0.13280
1998	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00202	0.01330	-0.15215	0.00355	0.01942	0.18272**	0.09076	0.11738
1999	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00042	0.01379	0.03023	0.00800	0.02103	0.38032**	0.10985	0.19295
2000	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00205	0.01485	-0.13791	0.00705	0.02360	0.29858**	-0.09083	-0.05486
2001	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00297	0.01355	-0.21916	0.00354	0.02562	0.13796**	-0.10953	-0.12101
2002	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00050	0.01208	-0.04157	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00502	0.01279	0.39290	0.00788	0.01707	0.46169	0.09697*	0.12182*
2004	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00349	0.01190	0.29302	0.00880	0.02151	0.40880	0.09898	0.04837
2005	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00575	0.01166	0.49276	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00385	0.01357	0.28395	0.00688	0.01291	0.53270	0.12317	0.03893
2007	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00679	0.01217	0.55757	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00114	0.02230	-0.05123	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00143	0.01861	-0.07692	0.00533	0.01971	0.27040**	0.13514	0.11220
2010	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00402	0.01212	0.33172	0.00632	0.01354	0.46676	0.07167*	0.10211

This table shows the currency-exchanged results of the naïve *1/N* diversification strategy. Specifically the table shows the composition of African stock markets used within each out-of-sample period along with the return, standard deviation and MRPUR of the resulting *ex-ante* portfolios. In order to facilitate a comparison, the remaining sections of the table show the actual *ex-post* optimal performance along with that of the UK- and World index-only portfolios during the forecasted period. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Despite this, during the earlier periods spanning 1996 – 2002, the performance of the *ex-ante* naïve portfolios was relatively poor. With the exception of 1999, the portfolios produced negative returns in each of the first seven periods examined, as well as in 2008 and 2009. The lowest of these occurred during 2001, with an associated risk-return ratio of -0.21916. Furthermore, compared to the UK- and World index-only portfolios, the method underperformed between 1996 and 2001.[199] This poor performance in these earlier periods results in an average MRPUR across all periods examined of only 0.11090, smaller than the best performing variation in each of the other methods of forecasting examined.

In order to provide a more detailed comparison of the gains generated by the various strategies two-sample t-tests were conducted to establish if the average MRPUR figures were statistically different; the results are provided in Table 6.7. The table shows that across all periods many of the average MRPURs for forecasting strategies outperform the naïve method. Specifically, all variations of five-year moving average, the three-year 2/8 moving average, the *ex-post* portfolios in the following period and the indicator variables for value traded, value traded as a percentage of GDP and turnover ratio, all perform better than the naïve *1/N* strategy on average. The best strategies are those within the 2/8 exponentially weighted moving average groups and the turnover ratio, confirming that these are the best performing of the alternative methods considered. Despite this, none of the approaches significantly outperform the naïve diversification irrespective of

[199] The local currency results for the naïve diversification strategy are detailed in Appendix 6.11 (Table 6.11A). The results again suggest that forecasts not exposed to the exchange rate produce more favourable returns than the Sterling-based results. For example, during the five year period 2003 – 2007, where the most favourable results occurred, the average MRPUR within the local currency testing was 0.54119, which is 33 percent greater than that for the currency exchanged equivalent; in addition, there are fewer instances where the forecast produces a negative return. During the first seven periods only 1998, 2000 and 2001 return negative MRPURs compared with the currency exchanged results, where all except 1999 do so. When compared with the UK- and World index-only portfolios during the early periods 1997 and 1998 (along with 2008 and 2009) the local currency results fail to outperform both of the former. In fact, with the exception of 2008 and 2009, the results reveal that both the UK and World index have been significantly outperformed by the forecasts in each period since 2003. This finding again points to the importance of hedging against the exchange rate when investing in the group of African markets examined here.

Table 6.7: Comparison of the Performance of Currency Exchanged Naïve *1/N* Portfolios with other Strategies

		Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value	Average MRPUR	P-Value
Average Performance basis	**Average Naïve MRPUR**	**3 Year Moving Average E-W**		**3 Year Moving Average (1/8)**		**3 Year Moving Average (2/8)**		**3 Year Moving Average (3/8)**		**3 Year Moving Average (4/8)**		**3 Year Moving Average (5/8)**		**3 Year Moving Average (6/8)**		**3 Year Moving Average (7/8)**	
All Periods	**0.1109**	0.0583	0.555	0.0970	0.881	0.1111	0.998	0.1086	0.980	0.0955	0.865	0.0975	0.883	0.0754	0.687	0.0504	0.483
1999 - 2002	**-0.0920**	-0.1494	0.392	-0.0768	0.844	-0.0768	0.844	-0.0768	0.844	-0.0800	0.880	-0.0860	0.942	-0.1010	0.918	-0.1572	0.347
2003 – 2007	**0.4040**	0.2370	0.100	0.3210	0.286	0.3360	0.400	0.3170	0.343	0.2890	0.249	0.2890	0.249	0.2470	0.110	0.2243	0.033
2008 - 2009	**-0.0641**	-0.0152	0.203	-0.1374	0.140	-0.0905	0.620	-0.0598	0.812	-0.0598	0.812	-0.0356	0.544	-0.0356	0.544	-0.0152	0.203
Average Performance basis	**Average Naïve MRPUR**	**5 Year Moving Average E-W**		**5 Year Moving Average (1/8)**		**5 Year Moving Average (2/8)**		**5 Year Moving Average (3/8)**		**5 Year Moving Average (4/8)**		**5 Year Moving Average (5/8)**		**5 Year Moving Average (6/8)**		**5 Year Moving Average (7/8)**	
All Periods	**0.1109**	0.1303	0.834	0.1473	0.700	0.1642	0.521	0.1461	0.708	0.1614	0.583	0.1170	0.938	0.1456	0.700	0.1184	0.933
1999 - 2002	**-0.0920**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2003 – 2007	**0.4040**	0.2730	0.229	0.3080	0.249	0.3232	0.350	0.2750	0.274	0.3050	0.301	0.2069	0.021	0.2720	0.249	0.2340	0.150
2008 - 2009	**-0.0641**	-0.0766	0.715	-0.1374	0.140	-0.0905	0.620	-0.0598	0.812	-0.0598	0.812	-0.0356	0.544	-0.0505	0.820	-0.0524	0.851
Average Performance basis	**Average Naïve MRPUR**	***Ex-Post* Portfolios in Following Period**		**Value Traded (£)**		**Value Traded % GDP**		**Turnover Ratio**		**FDI**		**Inflation**		**Market Capitalisation**		**GDP**	
All Periods	**0.1109**	0.1287	0.831	0.1114	0.995	0.1382	0.743	0.1592	0.533	0.0358	0.425	0.0638	0.639	0.0076	0.252	0.0593	0.563
1999 - 2002	**-0.0920**	-0.0440	0.527	-0.0152	0.331	-0.0152	0.331	0.1167	0.037	-0.1140	0.830	-0.1700	0.553	-0.0475	0.566	-0.0380	0.472
2003 – 2007	**0.4040**	0.3040	0.204	0.2260	0.047	0.2960	0.223	0.2540	0.101	0.2499	0.061	0.3030	0.207	0.1760	0.031	0.2826	0.116
2008 - 2009	**-0.0641**	0.0720	0.618	0.1250	0.417	0.1250	0.417	0.1010	0.508	-0.2280	0.441	0.0710	0.370	-0.2290	0.436	-0.1199	0.396

This table shows a comparison between the MRPUR results from the naïve *1/N* diversification strategy and all other forecasting bases. The table details the average MRPUR achieved within each of the implemented forecasts across all sub-periods, during 1999 – 2001, 2003 – 2007 and 2008 - 2009. In addition, the table also shows the results of a two-sample t-test comparing each of the individual forecasts with the naive method. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

the basis employed.[200] Similar findings surrounding the inability of *ex-ante* portfolios to consistently outperform the naïve method of diversification within emerging stock markets have been highlighted by Gilmore et al. (2005), whose investigation into central European markets concluded that for German investors, the naïve method of diversification remained the most effective at achieving out-of-sample returns.

A closer inspection of the table reveals that the forecasts vary substantially depending on the time period examined. During the period 1999 – 2002 the naïve method performs poorly with an average MRPUR of -0.0920. By comparison, several of the alternative forecasts including the three-year moving averages (exponentially weighted 1/8, 2/8, 3/8, 4/8 and 5/8), the *ex-post* portfolios in the proceeding period and several indicator forecasts (value traded, value traded as a percentage of GDP and turnover ratio) perform better during the comparable period. However, with the exception of turnover ratio, which not only records a positive MRPUR but is significantly greater than the naïve at the five percent level, the remaining forecast variants all record negative levels of MRPUR during 1999 - 2002. Similar findings are apparent during the later periods spanning 2008 – 2009, where the naïve method of diversification performs poorly, with a negative MRPUR of -0.0641. Although many of the variants within the three- and five-year moving average forecasts perform better than the naïve during this period, their resulting MRPUR ratios are negative. Only the forecasts using the *ex-post* portfolios in the following period and the indicator forecasts for value traded, value traded as a percentage of GDP, turnover ratio and inflation achieve positive MRPUR during this

[200] Although not reported here, two-sample t-tests were also carried out comparing the performance of naïve diversification and the moving average strategy forecasting just correlations and using actual *ex-post* returns and standard deviations as the other portfolio inputs. The naïve strategy and both the three- and five-year just correlation groups including each of the exponentially weighted variants within each method were compared. With no exceptions, the average MRPUR of all variants within both lengths of moving average were shown to be significantly greater than the naïve diversification method at the one percent level of significance. This finding suggests that the development of a more accurate method of forecasting returns and standard deviations would be successful for the group of African stock markets and consistently outperform the naïve diversification strategy.

period, although the difference compared to the naïve are not significant for all forecast variations.

In contrast to these findings the MRPURs generated by the naïve diversification perform best during times of global stability. In fact, during the periods 2003 – 2007 (where the majority of the forecasting strategies were most successful) the naïve strategy performed better than all other methods on average. During this particular five-year period the naïve method generated an average risk-return ratio of 0.40404. By comparison, during the same period the highest figure from the other strategies occurred within the three- and five-year 2/8 weighted moving average-based forecast, with an average risk-return ratio of 0.33600 and 0.32327, respectively. The poorest performing method compared to the naïve strategy during this period was the indicator forecast based on stock market capitalisation, with an average MRPUR of 0.1760, significantly less than the naïve strategy at the five percent level. In addition, the naïve method was significantly greater than the indicator forecasts for FDI and value traded, the five-year (5/8) and the three-year (7/8) at the five percent level, and the three-year equally weighted basis at the ten percent level. Interestingly, the turnover ratio during 2003 – 2007, with an average MRPUR of 0.2540, does not perform as well as in other periods compared to the other forecast strategies considered. This finding supports those of Middleton et al. (2007) surrounding investor concern with liquidity in emerging stock markets, while also suggesting that within this group of African stock markets the importance of stock market liquidity is enhanced during times of global economic instability.

6.5 Conclusion

This chapter has provided a detailed examination of the risk-return gains available from investing in African stock markets on an *ex-ante* basis. The analysis focused on the investment potential of these markets when the assumption of perfect foresight was relaxed. Four different methods of forecasting portfolios based on in-sample historical

data were investigated. The analysis included (i) an assessment of *ex-post* optimal portfolio identification as a method of forecasting future portfolios; (ii) a simple method of forecasting portfolio inputs using moving averages over various historical periods; (iii) the use of various stock market and economic indicators as a guide to future stock market performance; (iv) and a naïve *1/N* method of diversification which invests equal amounts in each market. The results demonstrate that while substantial theoretical gains are available from investment in African stock markets, they may be difficult for global investors to achieve in practice.

An analysis of the out-of-sample portfolios constructed on the basis of the various forecasting strategies produced several key findings with regards to the practical (*ex-ante*) achievability of the theoretical (*ex-post*) gains available from African stock market investment. First, a recurring theme across all of the various forecasting methods implemented during the analysis was the poor performance relative to the level of risk-return gains achieved within the *ex-post* optimal portfolios. For example, when compared with the latter all forecasting methods generated significantly lower average MRPUR's than the corresponding *ex-post* optimal portfolio. Despite this general pattern, the forecasts performed relatively well in certain sub-periods; although there were very few instances where the forecasts managed to achieve the full level of risk-return gains enjoyed by the *ex-post* optimal portfolios, in many instances the difference was not statistically significant. The results indicate that African markets can provide returns in excess of those achieved by the UK- or World index-only portfolios. In particular, with the exception of the forecasts constructed using improvements in stock market capitalisation and foreign direct investment, all other bases for portfolio construction outperformed the UK and World indices on average. Through investigation of the various sub-periods, the analysis revealed that only during periods of global economic instability, including the earlier forecast periods (spanning 1998 – 2001) and again during the later

periods (2008 and 2009) did the majority of the forecast methods fail to outperform the two indices. This finding contrasts with the results of Chapter 5, which indicated a favourable performance during all periods considered, and suggests that during such periods African markets may not provide as successful an avenue for diversification in practice as *ex-post* analysis purports. Furthermore, within the currency-converted results, only during 2007 did the majority of forecasts consistently significantly outperform the UK and World index again questioning the achievability of gains on an *ex-ante* basis.

Second, comparison between the various forecasting strategies indicated substantial variation in performance. On average, the best performing forecasts were the exponentially weighted 2/8 five-year moving average forecast and the stock market indicator forecast based on turnover ratio, where average risk-return ratios of 0.16423 and 0.15918 respectively resulted. Of the two, the turnover ratio provided better performance; for instance, although the higher overall level of returns was achieved with the five year 2/8 forecast, the analysis showed there were far more periods in which a negative level of MRPUR was achieved compared to when the turnover ratio was employed. In addition, the use of *ex-post* portfolios as the basis for an investment strategy in the following period was shown to be one of the better performing strategies, earning an average MRPUR across the single year periods of 0.12868. In contrast, the worst performing forecasts the indicator derived forecasts of stock market capitalisation and foreign direct investment which earned respective levels of MRPUR of only 0.00762 and 0.03580. Indeed, the performance of the indicator variable forecasts produced the most variability among average MRPUR returns, as suggested by both the highest and lowest risk-return ratios occurring in that category. This variation among the strategies employed suggests that investors should approach African investment with caution and that the incorrect choice of investment strategy can result in substantial losses.

Third, none of the out-of-sample forecasts consistently outperformed the naïve method. Although many of the other strategies did outperform naïve diversification during individual sub-periods (in particular during those surrounding periods of global instability) there was very little statistical difference between any of the forecasts. Only the turnover ratio during 1999 – 2002 significantly outperformed the naïve strategy at the five percent level. This finding supports DeMiguel et al. (2009), whose investigation into the forecasting ability of various extensions of the mean-variance model relative to the *1/N* approach concluded that none of the methods examined were able to consistently outperform the naïve strategy.

Fourth, despite the inability of the various *ex-ante* strategies to outperform the *1/N* strategy, there is compelling evidence to suggest that they would allow investors to attain similar levels of risk-return gains to those achieved by the African *ex-post* optimal portfolios. In particular, analysis of the strategy where forecasts are based solely on correlations, within both the three- and five-year moving average forecasts, showed that in none of the periods or weightings did the risk-return gains achieved by the forecast differ significantly from the *ex-post* optimal equivalents. Although this method utilised *ex-post* returns and standard deviations, and focused only on forecasting the correlation element of the portfolio inputs, the results clearly demonstrate that within the group of African stock markets examined the significant issue in portfolio choice is predicting returns and standard deviations. Furthermore, it has been suggested within the academic literature that stock returns contain a predictable element, which suggests that a more detailed examination of sophisticated methods of forecasting returns could prove successful in providing investors access to a greater proportion of the risk-return gains available from African stock markets.

Fifth, the results provide guidance regarding the approach to take when investing in African stock markets. For example, the forecasts created using information from the

more recent past significantly outperformed those created using older data. In particular, the exponentially weighted 2/8 forecasts within the three-year moving average (which focus on the recent past) significantly outperformed the equally weighted and 7/8 equivalents, both of which focus on a longer historical period. This pattern was also apparent within both the three- and five-year moving average forecast groups under local currency testing conditions. In addition, the results show that the most useful predictors of future returns within African stock markets are liquidity and stock market importance. Within the indicator-created forecasts, the two best performers were turnover ratio and the value of stocks traded as a percentage of GDP. Furthermore, from the perspective of a UK investor the use of the turnover ratio as a measure of future performance was shown to be significantly better than both the UK and World index. In contrast, stock market capitalisation was shown to be the least accurate basis for forecasting future market performance.

Finally, in order to obtain the best possible risk-return gains within African stock markets the global investors should seek to re-balance their portfolios on at least a yearly basis. The results suggested that the level of risk-return gains achieved by the forecasts were substantially reduced beyond a year from the point of construction in which it was implemented. In addition, investors should seek to hedge against exchange rate risk; the average risk-return gains in local currency were greater than the currency exchanged results.

Chapter Seven

Conclusions, Limitations and Avenues for Future Research

7.1 Introduction

This chapter provides a summary of the main findings of this thesis. The chapter brings together the results from the empirical analysis and discusses the implications of the findings for UK investors considering diversifying into African stock markets. In addition, the chapter acknowledges the limitations of the research carried out and provides an indication of future avenues for research.

This thesis explored the benefits of including African emerging stock markets in a well-diversified global investment portfolio from the perspective of a UK investor. In particular, it examined the interrelationships of African stock markets with the UK over the 1996 to 2010 period in order to assess the diversification potential of these markets. The thesis also looked at the impact of crisis periods on the relationships between the markets. The thesis then sought to quantify the theoretical gains available from investing in African stock markets, as well as considering the extent to which these gains are achievable in practice.

The remainder of this chapter is organised as follows. Section 7.2 summarises the key findings of the thesis and discusses the implications of the results. Section 7.3 outlines the limitations of the thesis. Finally, some suggestions for future research into African emerging stock markets are highlighted in Section 7.4.

7.2 Conclusions and Implications of the Thesis

The analysis within this thesis has highlighted a number of implications pertinent to UK investors considering investment in the emerging stock markets of Africa. First, in line with the findings from previous studies that have investigated the benefits of diversifying into emerging stock markets in Asia (Bailey and Stultz, 1990), Latin America (Islam and Rodriguez, 1998) and Europe (Gilmore and McManus, 2002), this thesis demonstrated that

African stock markets offered the opportunity for UK investors to improve portfolio performance. Specifically, Chapter 2 described the liberalisation and financial reforms that many African markets have undertaken which have resulted in an improvement in the investment climate. These new government policies have eased structural and political problems and lowered barriers to investment. Stock exchanges have also been established in several African countries, while others have improved the efficiency of their operations. These reforms have led to higher economic growth, lower inflation, increased foreign investment, and improved stock market liquidity.

Second, the results showed that African stock markets are weakly related to the UK market indicating the potential for a UK investor to achieve significant diversification benefits. Within each of the periods examined it was possible to create a portfolio consisting of African stock markets that outperformed the UK-only portfolio. The analysis also indicated the potential of these markets to offer a UK investor diversification opportunities during times of economic crisis. That is, the findings in Table 4.4 showed that over the Asian crisis, the Dot Com crisis and the Banking crisis, the potential for diversification increased significantly during the crisis periods. In addition an analysis of the transfer of shocks between the UK and African stock markets indicated that there is very little causality between the markets. Although the results indicated that periods of global economic instability caused a strengthening of the short term relationships, the effect did not persist beyond the crisis period.

Third, building on the above findings this thesis provided an investigation into the theoretical gains available from investing in African stock markets. The results suggested that UK investors wishing to include an African emerging equity component in their investment portfolio can both increase portfolio returns and reduce portfolio risk. In all periods examined, the optimal portfolio of African stock markets exhibited a higher level of

MRPUR relative to the UK-only portfolio. The construction of *ex-post* optimal portfolios also revealed that within certain periods the full benefits from diversifying into African equity markets could be achieved by investing in only a few markets; in some test periods, the optimal portfolio ranged from a minimum of one market to a maximum of seven.

Fourth, it is evident from the results that care is needed when formulating an investment strategy which includes African emerging stock markets as the returns, variances and covariances change over time. The *ex-ante* analysis revealed that the full level of theoretical gains available within the group of African stock markets is much harder to achieve when relying on historical data to forecast portfolio inputs. Most forecasting methods led to a portfolio performance that was significantly lower than the corresponding *ex-post* performance. This finding supports Fifield et al. (2002) who found that very few of the *ex-post* gains were achievable on an *ex-ante* basis. However, despite the relative inability of the forecasting methods employed to reap the full risk-return gains documented in *ex-post* analyses, several of the *ex-ante* strategies recorded risk-return gains that were not statistically significantly lower than the corresponding *ex-post* optimal results.

Fifth, the various forecasting strategies employed failed to consistently outperform the Naïve method of diversification and, as such, corroborate the findings of DeMiguel et al. (2009). Despite this apparent failure of forecasting methods, there were clear differences between their performance. Forecasts that utilised historic data from the more recent past earned higher risk-return gains across all sub-periods compared with forecasts that incorporated historic data from the more distant past. Overall, stock market liquidity was shown to be a better indicator for the future performance of African stock markets as compared to stock market capitalisation and FDI. Similar findings on the predictive ability of liquidity for future stock returns was also noted across a large cross section of 19 emerging stock markets by Bekaert et al. (2007).

Sixth, some African stock markets had more diversification potential for UK investors than others. Amongst the best performing African stock markets over 1996 to 2010 were Mauritius, Morocco and Nigeria. These markets appeared most frequently in both the cointegration-free portfolios and the optimal African portfolios. Not surprisingly, South Africa was shown to be the least effective for providing diversification opportunities to a UK investor; it had the highest return correlation with the UK and appeared infrequently in both the cointegration-free and optimal African portfolios.

This thesis also noted that diversification potential varied over time. In particular, the poorest performing portfolios occurred in the crisis periods. This result supports findings from other studies, such as Wang et al. (2003), where it was demonstrated that crisis periods may lead to a reduction in the benefits from investing in African stock markets.

Finally, some of the findings from the empirical analysis have strategic implications for UK investors. In particular, exchange rates appear to play an important role in portfolio performance; portfolios denominated in local currency had higher risk-return ratios compared to those exposed to the exchange rate. Thus, UK investors wishing to diversify into African emerging stock markets should consider hedging against exchange rate fluctuations. The results also indicated that UK investors should adopt shorter-term investment horizons and consider re-balancing their portfolios on a yearly basis.

7.3 Limitations of the Study

The purpose of this thesis has been to investigate the interrelationships between African stock markets and the diversification potential of these markets to UK investors. The thesis included ten African stock markets and examined (i) long- and short-term relationships between the UK and African stock markets; (ii) the theoretical gains achievable from investing in African stock markets; and (iii) the performance of simple forecasting strategies.

Although the results of this thesis clearly indicate that African emerging equity markets can offer significant risk-return gains for UK investors, there are several limitations that must be considered. First, this thesis has taken a quantitative approach to examine the investment potential of African emerging stock markets. However, it is important to recognise that this approach ignores the more qualitative aspects of research which could have provided further information regarding investment in these markets, such as the current approach that investors take when diversifying into this group of markets. As such, the use of more qualitative techniques, such as interviews with active investment managers in the African region, could have gained a valuable insight into aspects associated with investment into Africa, while also providing more detailed information with which the results throughout this analysis could have been compared.

Second, due to the embryonic nature of many African stock markets, disaggregated company-level data were unavailable for the range of markets and time periods studied. Therefore, the analysis employed index level data and assumed that investors can trade these indices which, in practice, is unrealistic.

Third, the thesis utilised an integer quadratic programming method to arrive at MRPUR-optimal portfolios. More specifically, portfolio weightings were restricted to the discrete values of 0 or $1/k$, where k is the number of indices in the portfolio. Although the use of this integer quadratic programming method does not impact the significance of the results obtained it may underestimate the maximum level of MRPUR that could be achieved by allowing portfolio weights to vary continuously.

Fourth, the conclusion that periods of global economic crisis have only a temporary effect on the potential of African stock markets to offer UK investors meaningful diversification should be treated with caution as the nature of crises may differ significantly (Fifield et al., 2006).

Fifth, standard deviation was used as a measure of risk. Although risk is measured by standard deviation in finance, other risk factors may be important in practice. In particular, other factors which impact investment into emerging markets are political risk, economic risk, country risk, exchange rate risk and liquidity risk, all of which are not captured by standard deviation. As indicated in Chapter 2 of this thesis these risks are found to be inherent in many emerging markets of Africa. Therefore, the use of standard deviation may understate the level of risks involved when investing in African stock markets.

Finally, one exclusion from the analysis of the gains in African stock markets examined in this thesis has been transaction costs. These costs are difficult to obtain among African stock markets and their inclusion may erode the level of gains that are achievable in practice. In particular it has been highlighted within the literature that transaction costs in African stock markets can have a significant impact on the level of returns achievable (Appiah-Kusi and Menyah, 2003). Therefore the exclusion of these costs in the empirical analysis could have resulted in an overstatement of the gains available.

7.4 Avenues for Future Research

A number of avenues for future research are apparent from the analysis conducted within this thesis. First, in order to provide a more realistic investigation into the benefits of investing in African stock markets, future research could employ disaggregated company-level data. This would allow a more detailed investigation into the performance of various sectors within the African markets and would create a more practically achievable investigation into the benefits of diversifying into African markets. Second, future research could incorporate transaction costs. The recognition of such costs would allow for a more accurate assessment of the gains within African stock markets. Third, by removing the restriction placed upon the weightings of the optimal portfolios through the integer quadratic

programming strategy employed, future research could allow portfolio weighting to vary. In doing so, it would provide a more detailed indication as to the level of returns and risk reduction available within African stock markets.

Finally, despite mixed evidence surrounding the success of the various forecasting strategies employed within this thesis to accurately predict future optimal African portfolios based on historical data, it was noted that the ability to accurately forecast returns is critical to portfolio performance. Specifically, using *ex-post* returns and standard deviations and forecasts of correlations only resulted in nearly all of the *ex-post* optimal gains being achieved by the forecast. Compared to the strategies that forecasted returns, standard deviations and correlations, this finding suggests that an accurate forecast of returns would significantly improve the overall gains achieved. Additionally, it was noted that strategies constructed on the basis of improvements within stock market liquidity on average significantly outperformed that of the UK and World index-only portfolios. Within the academic literature it has been suggested that stock market returns do contain a predictable element (Campbell and Schiller, 1988; Bekaert et al., 2007; Hjamarsson, 2010). Therefore, future research into African stock markets could employ more sophisticated methods of forecasting while also providing a more detailed investigation into the ability of improvements in stock market liquidity to predict future stock market returns.

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Appendix

Appendix 2.1: Country Profiles

Botswana

Botswana is home to an estimated 2,100,000 people. Inhabitants have a low life expectancy of 59 for males and 62 for females (World Health Organisation, 2012). This rate is partially due to the high prevalence of HIV and Aids which is believed to be the second highest in the world (CIA, 2012). There is also a high risk of other infectious diseases such as waterborne viruses and bacterial infections, hepatitis, typhoid fever, tuberculosis and malaria. Compounding this, 47 percent of the population lives below the national poverty line and have poor access to healthcare. Since gaining independence from colonial Britain in 1966, Botswana has experienced a stable, fair leadership and continuing economic development. Currently, Botswana is a republic and is run by the Botswana Democratic Party. Since election in 2009, the government has made continuing steps to improve public life and develop the economy, making significant improvements in areas such as health, industry and education (Republic of Botswana, 2011). This has also seen the country become increasingly urbanised with 61 percent of the population now residing in towns or cities, the largest being the capital city of Gaborone, home to approximately 190,000 people. On average, access to drinking water has improved by 95 percent and sanitation levels have increased by 60 percent highlighting the improvements being made as the nation develops into a middle income country (World Health Organisation, 2012).

The nation's land covers 600,370 km^2 of Sub-Saharan Africa and Botswana is landlocked with bordering countries of Zambia to the north, Zimbabwe to the east, South Africa to the south and Namibia to the west. Botswana relies heavily upon mining for its income. The country is home to some of the largest and richest diamond mines in the world; in 2009 the income generated from the diamond industry amounted to 26 percent

of total GDP (African Economic Outlook, 2011). The country's main trade partners are South Africa and the UK. However, the influence of China in Africa can be clearly seen; imports from China to Botswana have increased from $35.3 million in 2006 to $276.3 in 2010 (United Nations, 2010). Other major contributors to the country's GDP are government services, agriculture and trade. Due to its unique ecological complexities, Botswana continues to develop into a popular tourist destination (United Nations in Botswana, 2001). The terrain is biologically diverse consisting of hills, rocky lands, wetlands and deserts. The Kalahari Desert, which covers much of Botswana, is home to an impressive array of plants and wildlife, particularly along its river paths and during the wet seasons.

The Botswana Stock Exchange (BSE) was established in 1989 as the Botswana Share Market, with only five listed companies and a single broking firm. Since then many strides have been taken to attract new companies and develop new products. In 1995 the BSE was established and, as of 2010, has 21 domestic listed companies with a market capitalisation of $4.076 billion, and 11 foreign companies. It also offers a variety of government and corporate bonds along with a Gold Bullion Exchange Traded Fund. The BSE is regulated by the Non-Banking Financial Institutions Regulatory Authority which provides listing rules for companies, ensures that the exchange is operated to maintain fair dealing, is involved with investor protection regulates its member's affairs and the disclosure of issuer information to the public in order for them to make informed investment decisions. While the trading system in place remains an open-cry manual trading system, as of 2008, clearing and settlement procedures are conducted through an electronic MillenniumIT system, with a current settlement time of approximately four days. Despite Botswana's heavy reliance on natural resources as a source of GDP, it is the Banking sector that was most active in 2009, followed by Financial Services, Retail and then Mining (African Securities Exchanges Association, 2009; Botswana Stock

Exchange, 2012). The exchange itself operates trading hours from 9:30 – 10:30am daily and market entry and exit have remained free during 2000 to 2009. The table also shows a change in the ceiling for foreign investors investing in listed companies on the exchange. As of 2000, investments were restricted to 55 percent for institutional investments and only 10 percent for private investments. However, as of 2012 the regulations have improved with no investment ceiling on listed stocks, for either institutional or private investors, helping to encourage wider investment. However, there is a 7.5 percent withholding tax on all dividends earned, along with a ten percent tax on interest.

Egypt

With an estimated population of 83,700,000, Egypt is one of the more developed African nations and, in recent years, has achieved high levels of economic growth. Despite this, many problems with unemployment and poverty have persisted, with 20 percent of the Egyptian population living below the poverty line and unemployment levels estimated at around 25 percent (CIA, 2012). The country's area mass is approximately 1,002,000km^2 and consists of urban cities, water areas and deserts. The country borders the Gaza Strip to the east, Sudan to the south and Libya to the west. Egypt's coast line on the northern side borders the Mediterranean Sea and the Red Sea coast lies to the east. The Nile River is well known for its scenic and practical and economic properties and, in 1950, the Aswan Dam was built over the Nile in the 1950's harnessed the annual summer floods to allow for control and storage of water for irrigation. This dam has had a great impact on the outlook of the agricultural economy and is also used as a strong source of hydroelectricity. The Nile and other attractions, such as the pyramids and the country's iconic past, have kept tourist interest in Egypt high (UN, 2012). Egypt's other main exports are oil, cotton, textiles and chemicals (CIA, 2012). While the US remains Egypt's main trade partner for both imports and exports there is evidence of increasing influence from China, where import levels have increased

from $1.2 billion in 2006 to $4.9 billion in 2010, comparable to the level of imports to Egypt from the US (United Nations, 2010).

Egypt gained partial independence from Britain in 1922 and achieved full sovereignty in 1952. However, due to a rapidly increasing population, a lack of arable land and despite many economic reforms, the government has struggled to meet the demands of the growing population. Increases in food prices, increased inflation, lack of free speech, low minimum wages and rising unemployment have resulted in rising tension within the country and caused much political upheaval in recent years (CIA, 2012). Following the resignation of president Hosni Mubarak and Prime Minister Ahmed Shafiq in early 2011, the country came under military rule. The Supreme Council of the Armed Forces took place as head of state in February 2011 until presidential and parliamentary elections could be held. In June 2012, in only the second multicandidate election, Islamist leader Mohammed Morsi became the new president. While this development has promised much political and social reform with the aim of transforming Egypt into a democratic state, there are still many uncertainties for the future (African Economic Outlook, 2011).

The Egyptian stock exchange (EGX) is one of the more established exchanges within Africa and the two major exchanges, Cairo and Alexandra, date back over 125 years. In 2008, as part of a program of modernisation the two exchanges were merged to form the EGX, which is now operated by the same chairman. As of 2010, the exchange had 213 domestically listed companies, with a market capitalisation of $82.495 billion and offers a wide variety of products to investors, including government and corporate bonds, closed-end mutual funds and various exchange-traded funds. While the first new automated trading system was introduced in 2001, the exchange incorporated a new powerful electronic trading system in 2008 called X-stream, and current settlement periods are the same day for many securities and the next day for treasury bonds.

Regulated through the Egyptian Financial Services Authority, the exchange has listing requirements aimed at meeting international standards. These standards are periodically reviewed the exchange also maintains an effective policy for imposing strict disclosure and corporate governance rules on its issuers. In 2009, with the aim of providing better access for both local and foreign investors, the Egyptian exchange launched both the EGX 70 and EGX 100, which track the performance of the 70 and 100 most active companies outside of the previously established EGX 30. Although the exchange suspended trading at the end of January 2011, as a result of the revolution, trading fully resumed by the end of March of the same year (African Securities Exchanges Association, 2009; The Egyptian Exchange, 2012). The exchange has been fully open to foreign investors since 2000, imposing no restrictions on market entry or exit and no investment ceiling. However, compared to other African exchanges, the transaction costs of trading in the Egyptian exchange are high, with an average transaction cost of 0.56 percent.

Ghana

In 1957 Ghana became the first sub-Saharan African colony to gain independence. The country today is a Republic and unlike some other African countries the recent political journey has been stable and not impeded by armed factions. The four yearly Presidential elections have been peaceful and any citizen of the country over the age of 18 years can vote. Of all the countries examined in this research Ghana has the highest expenditure on education as percentage of GDP, in fact on this measure Ghana is ranked 12th in world (CIA, 2012). However, Ghana does continue to have gender inequality in respect of the access to education, health and policy making. Ghana, alongside all other examined markets other than Morocco, is a member state of the African Union which strives to make the continent peaceful, prosperous and become a positive influential force on the global economy (African Union, n.d.). The population of Ghana is over 25 million has there is a life expectancy of 62 for males and 67 for females which is reflective of the

excess mortality resulting from infections including AIDS. The country also shares the high risk status for other infections spreading from water, food and animal sources. Additionally the proportion of the population living below the poverty line is estimated at around 28 percent (The World Bank, 2012).

The country covers 238,533 square km on the coast of the Atlantic Ocean, to the East of Ivory Coast with other neighbouring countries of Burkina Faso and Togo. Ghana's main trading partners are US, Netherlands, Germany, Nigeria, France and China. The country's major exports commodities include oil, cocoa, gold, tuna and aluminium (CIA World Factbook 2012). Being a country with a colourful safe culture, tropical climates and a mix of sandy beaches and forest national parks, Ghana is becoming an increasingly popular tourist destination. In recent years in particular tourism has become an important part of the Ghanaian economy earning an estimated US$1.5 billion in 2007 which is expected to grow year after year (Bank of Ghana, 2007).

The Ghana Stock Exchange was established as a private company in 1989, and is limited by guarantee under the Ghana Company's code. It was only in 1990 when the exchange gained recognition as an authorised stock exchange that trading within the exchange commenced. Since then the exchange has moved over to public ownership and is governed through a nine member council, which includes representatives from licensed dealing members, listed companies within the exchange (African Stock Exchange Association Yearbook, 2013). As of 2012 the exchange held 31 domestically listed companies, with a market capitalisation of US$ 30.46 billion offering a variety of markets including equity, bonds and derivatives. The exchange has two main indices, the GSE composite and the GSE Financial stocks index. During 2012 the return of the GSE composite index was 23.81 percent, which had increased significantly from 2011 where it returned a loss of -3.10 percent. Since 2009 the exchange has operated through an electronic system for both trading and settlement, which has resulted in clearing and

settling time of anything between immediate to three days (African Stock Exchange Association Yearbook, 2013). Although market entry and exit restrictions have been free since prior to 2000, there are several restrictions placed on investment ceilings. Specifically, there is a 74 percent investment ceiling placed on all listed stocks, and as of 2012, this has changed to also include a ten percent investment ceiling on single entity investment. Furthermore, there is also an eight percent withholding tax on all dividends earned.

Ivory Coast

Ivory Coast is home to over 22 million people with a life expectancy of 56 for males and 58 for females (CIA, 2012). This low life expectancy, like many other countries in African is partially due to the high risk of infections including HIV and other viruses and bacterial infections spread from various sources. There is a high level of unemployment estimated at 60 percent of the 15 to 35 age group and an estimated 42 percent live below the poverty line (The World Bank 2012). However the country's 2012-2015 National Development Plan allocates spending and implement policies to tackle this issue (African Economic Outlook 2011). Additionally, gender inequality has a large prevalence in health, education and decision making, in an investigation of 135 countries the World Economic Forum (2013) ranked the Ivory Coast 131st.

The country has a land mass of 322,463 square km and is situated on the Atlantic Coast bordering Ghana, Burkina Faso, Mali, Guinea and Liberia. Ivory Coast main trade partners are the US, Netherlands, Germany, Nigeria, France and China (UNdata, 2012). The exportation of commodities such as cocoa, coffee, palm oil, natural rubber and gold has made the Ivory Coast one of the most prosperous in West Africa but the country has experienced significant political unrest since independence from France in 1960, including a civil war in 2002. Not until 2012 did the country begin to experience political and social improvement which in turn saw an improvement of economic activity

highlighted by growth of 8.6 percent in GDP in that year (African Economic Outlook, 2011). Unfortunately the political unrest has significantly impeded the tourism sector in the Ivory Coast, which has yet to take off but the country does have lots of potential in terms of future tourism thanks to beautiful varied geography of beaches, forests, mountains and tropical savannahs (Oxford Business Group, 2013).

Ivory Coast is part of the Bourse Regionale des Valeurs Mobilieres, a regional stock exchange in West Africa including eight markets, Benin, Burkina Faso, Ivory Coast, Guinea Bissau, Mali, Niger, Senegal and Togo. The exchange was established in 1998 and is regulated through the regional council for public savings and financial markets, who control and regulate the whole regional financial market within the West African Monetary Union (Making Finance work for Africa, 2013). With 39 domestically listed companies in 2012 the market capitalisation of the stock exchange was US$8.10 billion, which represented an increase from the previous period of 26.89 percent. During the same period the trading volume within the exchange reached US$293.09 million, an increase of approximately 63 percent from 2011, which reached US$179.27 million. Furthermore during 2011 to 2012 there has been an increase in liquidity within the exchange, represented by an increase in the turnover ratio from 1.86 percent to 2.15 percent in 2012 (African Stock Exchange Association Yearbook, 2013). The exchange runs using the electronic trading system Quick Trade, which was installed during 2012 and gives access to equity markets along with government, corporate and institutional bonds. Clearing and settlement the systems vendor PERCIVAL limited, which was implemented when the exchange opened in 1998, with clearing taking approximately three days (African Stock Exchange Association Yearbook, 2013). There are no restrictions on market entry on exit, which has remained consistent since 2000, however there is a ten percent withholding tax on any dividends earned.

Kenya

Kenya is home to approximately 43,000,000 people and, suffers from similar health issues to that of Botswana, with a high prevalence of HIV and aids. The country also has a high risk of infectious diseases such as bacterial and protozoal waterborne infections, hepatitis A and malaria. As a result, the population life expectancy at birth is low and only 62 for males and 64 for females (CIA, 2012). Since gaining independence from Britain in 1963, the political situation in Kenya has been relatively stable in comparison to some other African nations, with general elections being held every five years. In 1991, a new constitution was put in place to reintroduce multiparty politics and put a two term limit on re-election. A revised constitution was adopted in 2010, stating that the values of the Kenyan Government are to recognise human rights, equality, freedom, social justice, law and democracy. The new constitution also increased the powers and autonomy of the local governments within each of the 47 counties in Kenya and introduced the people's bill of rights (Embassy of the Republic of Kenya, 2012).

The country lies on the equator and covers an area of 580,367km^2 bordering Ethiopia and South Sudan to the north, Somalia to the east, Tanzania to the south west and Uganda to the west. The south east boundary is coastal lying on the Indian Ocean (CIA, 2012). There is a tropical climate in the coastal regions and to the west near Lake Victoria. The middle terrain is grasslands and mountainous areas; Mount Kenya has snow-capped peaks. The north eastern regions are arid and semi-arid with desert landscapes. The central and western areas are rich in wildlife and are famous world-wide for their national reserves and safaris. While the capital city of Nairobi is the commercial hub of the country, Kenya also boasts one of the most successful agricultural regions in Africa; its main economic and employment sector is maize, potatoes, tea, coffee and sugarcane (African Economic Outlook, 2011). The main trade partners include Uganda, Tanzania and the UK, with the largest increase in terms of import trade coming from

China, whose imports have increased from $414 million in 2006 to $1.52 billion in 2010 (United Nations, 2010).

The Nairobi Stock Exchange is the largest and longest serving securities exchange in East and Central Africa, after its establishment in 1954. As of 2010, the exchange had 55 domestic listings with a market capitalisation of $14.461 billion and gives investors access to both equity and bonds. The two main indexes are the NSE 20 and the NSE all-share index and the exchange is regulated through the Capital Markets Authority (Kenya), which aims to provide for and develop the efficiency of the securities market. In 2004, the exchange implemented a MillenniumIT automated system to deal with clearing and settlement, which was followed in 2006 by the implantation of a MillenniumIT automated trading system. While the current settlement period is five days, the exchange launched its first government treasury bond via the automated system in 2009, where the settlement period is only three days. The implementation of the automated systems has not only increased liquidity within the exchange but also reduced operational risk and allowed for more efficient dissemination of bond information. The exchange operates on a daily basis from 9:00am – 3:00pm and during 2009 the most active sectors were commercial and services, finance and investment and industrial (African Securities Exchanges Association, 2009). The investment ceiling for foreign investors has improved slightly from 2000 to 2012, with an increase in the ceiling from 40 to 60 percent. However, there remains some registration processes for foreign investors on market entry to ensure repatriation rights.

Mauritius

Mauritius lies in the Indian Ocean off the south east coast of the African continent and has a land area of 2,040km^2. There are no indigenous people and the island has seen periods of colonisation from Portugal, the Netherlands, France and Britain. Today there is a population of 1,313,000 and infrastructure and health facilities are good with 99

percent having access to clean water sources and over 90 percent have access to acceptable sanitation facilities (CIA World Factbook 2012). The climate is tropical with a dry winter and wet humid, summer. Inland from the coast are mountains and national park areas. The island is geologically unique, a production of volcanic eruptions its central land area is surrounded by mountains, that is in turn is encircled by coastal plains, long stretches of white sandy beaches, coral reefs and areas of national reserves for the protection of other endangered plants and animal species. As a result of this the island is an extremely popular tourist destination and is a major contributor to the country's economy (CIA, 2012).

Mauritius gained independence from Britain in 1968 and has continued to have fair democracy and a respectable human rights approach. The government in Mauritius is fully democratic, with a ruling coalition between the Labour Party and the Militant Socialist Movement (BBC News, 2012a). According to the 2011 Ibrahim Index, which measures government quality and performance, Mauritius ranks highest out of all African countries[201] (African Economic Outlook, 2011). The main trading partners of Mauritius are India, China, UK, France, South Africa and the US (United Nations, 2010). While the economy is heavily dependent upon sugar, textiles, tourism and financial services, the government has strived to diversify the economy and the country is beginning to expand into fish processing, information technology and property development. Furthermore, despite the 2007global downturn, Mauritius responded relatively well with GDP growth of four percent between 2010 and 2011 (CIA, 2012).

The Stock Exchange of Mauritius, which was established in 1988, has quickly become one of the leading exchanges in Africa. The main market index is the SEMDEX; this index covers all listed companies within the exchange and includes the current 86

[201] The Ibrahim index was established in 2007 and comprises the most comprehensive set of quantitative data relating to governance in Africa. The index provides an annual review of governance in each African country (Ibrahim Foundation, 2012)

domestic listed companies, which have a total market capitalisation of $6.506 billion. The exchange operates a 9:00am – 1:30pm trading day, is regulated by the Financial Services Commission and trades many products including equities, bonds and derivatives. The demutualised exchange, which is run as a public company, has been successful in ensuring it is a leader in reform and development and promoting the financial sector in Mauritius. Since 2001, the exchange has made use of Millenium IT as an automated system for both its trading activity and its clearance and settlement, which currently takes three days. During 2009 the most active sectors in the market where Investments, Banks, Insurance and other Finance, Leisure and Commerce. The exchange is a leading small exchange in Africa, due largely to the implementation of initiatives on both a technological and operational levels. In 2010, the exchange changed its listing rules to allow for and attract global and specialist funds, such as professional and specialist investment schemes. Other initiatives include the training of the exchanges stakeholders in derivatives, following the approval of rules for trading and settlement in futures and the establishment of corporate socially responsible activities which are aimed at encouraging entrepreneurship among younger students (African Securities Exchanges Association, 2009). There were slight improvements in listing regulations between 2000 and 2012; although there are still some registration procedures required to ensure repatriation rights before listing on the exchange, the investment ceiling of 15 percent placed upon sugar companies can now be exceeded with the permission of the Financial Services Commission.

Morocco

Morocco has a population of approximately 32,300,000 and general health is good with the population life expectancy at birth 73 for males and 79 for females. However, there are high levels of unemployment and poverty in some regions of the country, with unemployment of the working age group under 25 estimated at 25 percent and a further

15 percent estimated to be living below the poverty line (CIA, 2012). The country shares borders with Algeria and Western Sahara. Morocco's north western regions are on the coast of the North Atlantic Ocean and the north eastern areas lie on the coast of the Mediterranean Sea. The country covers 446,550km^{2}and the terrain is a combination of mountains, forests, plains, valleys and beaches. The close proximity to Southern Europe and the diverse Moroccan landscapes have attracted tourism to the country which has served as a significant boost to the economy (CIA, 2012).

After a long struggle with France, Morocco gained independence in 1956. The country is run through a constitutional monarchy with the King being head of state and the Prime Minister as head of government. Following a general election in 2011, the Justice and Development Party were voted into power and became the first Islamist party to head parliament. Under the reign of King Mohammed VI, Morocco has experienced a number of reforms working towards human development goals in response to public protests (US Department of State, 2012). Agriculture is the main sector contributing the Moroccan economy with its main produce including cereals, sugar crops and leguminous plants. Other growing sectors include textiles, mining and renewable energy. Morocco has many free trade agreements in place with United Arab Emirates and the European Union and new trade partnerships have also been formed with other emerging markets including Saudi Arabia, China and Brazil (African Economic Outlook, 2011).

The Moroccan stock exchange, or the Bourse de Casablanca, was established in 1929 and has undergone many major reforms with the aim of enhancing the market's attractiveness to both foreign and domestic investors. In 1993, the exchange created a financial markets authority council, known as the Conseil Deontologique des Valeures Mobilieres, whose aim is to ensure investor protection. The Societe de Bourse des Valeures de Casablanca, a private company was also created and is responsible for the management of the stock exchange. During the same year the exchange also introduced authorised brokerage firms

and mutual funds. In 2009 the exchange incorporated a new set of corporate governance rules, requiring the exchange to report to the Ministry of Finance and Privatisation. As of 2010, the Bourse de Casablanca had 73 domestic listed companies with a market capitalisation of $69.153 billion and trades products in the equity, cash and bond markets. The most active sectors during 2010 were Banks, Real Estate and Telecommunications. In 1997 the exchange introduced an electronic-based trading and settlement system, which was upgraded again in 2001, and has resulted in the settlement period declining from five to three days. Although the market operates a trading day of 9:00am to 3:30pm, a system called Trading At Last was introduced in 2009 with the aim of improving market liquidity. The process occurs after the auction has finished and allows traders to enter orders at the closing price; as a result, the market's times have been increased to close at 3:35pm (African Securities Exchanges Association, 2009). The Casablanca stock exchange has remained fully open to foreign investors during 2000 to 2012, with investment ceilings of 100 percent throughout and no restrictions in place for market entry or exit.

Nigeria

Nigeria is Africa's most populated nation with around 170,120,000 people. The country suffers heavily from many diseases such as HIV and aids and has the second highest level of people living with and dying from the infection. There are also many other food and waterborne infectious diseases, aerosolised dust diseases and respiratory infections, resulting in an extremely low life expectancy of 49 for males and 55 for females. This is significantly impacted by the high prevalence of HIV and aids. Furthermore, there is also a high level of poverty within the country with 70 percent of people living below the poverty line (CIA, 2012). The country borders Niger and Chad to the north, Cameroon to the south-east, Benin to the West and the South coastal border is the Gulf of Guinea. The country's land area spans 923,768 km^2 and is rich in natural

resources, such as natural gas and petroleum, with the climate varying from arid in the north to more tropical further south (CIA, 2012).

Following independence from Britain in 1960, Nigeria was governed under military rule until 2009 when the country transformed into a civilian government. However, there are many on-going tensions throughout the country related to religion and ethnicity. Outbreaks of violence have become common place and as such prove a significant barrier to foreign investment (BBC News, 2012b). Additionally, corruption has been rife in the economy as highlighted by the widespread poverty in a country whose oil revenues are extensive, an issue which the current government is aiming to resolve (African Economic Outlook, 2011). The economy is highly dependent on both the oil and agriculture sectors, with its main trade partners being China, US and India (United Nations, 2010). Good weather conditions in 2010 aided crop production and led to a growth rate in the sector of 6 percent (African Economic Outlook, 2011). Included in this produce are cocoa, rubber, cotton and palm oil (CIA, 2012). On the other hand, the oil sector declined as a result of militant struggles; in 2005 Nigeria produced 2.5 million barrels of oil per day and this fell by 40 percent in 2008 due to the destruction of oil production facilities by militant activists. Although revenues are increasing, violence and unrest remain a major threat to oil earnings (African Economic Outlook 2011).

The Nigerian Stock Exchange was launched in 1960 as the Lagos Stock Exchange and was renamed as the new Nigerian Stock Exchange in 1977. It holds branches in 12 of Nigeria's major cities, with the head office remaining in Lagos. The exchange operates a 9:30am to 12:30pm trading day, although this was extended to 2:30pm in 2010. During 1996 the exchange abolished the 14-day settlement period and introduced a weekly settlement period. In 1999 the traditional open outcry trading system was upgraded to a fully automated system for both trading and settlement in each of the exchanges branches; this development led to the settlement period being further reduced in 2000 to three days.

The main market index is the NSE All-Share and it was launched in 1984. However, in 2008 the exchange launched the NSE 30 index, which tracks the 30 largest companies listed on the exchange. In 2010, the exchange had 215 domestic listed companies with a total market capitalisation of $50.883 billion and offers a wide variety of products including equities, bonds, commodities and funds, including unit trusts and equity funds (African Securities Exchanges Association, 2009; The Nigerian Stock Exchange, 2012). Furthermore, during the period 2000 – 2012 the listing regulations were slightly relaxed, with repatriation rights available without following various registration procedures a requirement that had to be adhered to at the end of 2000.

South Africa

South Africa has an estimated population of 48,800,000 covering an area of 1,219,090km^2 typified by hills, plains and coast. Like many other African countries its population suffers from a high prevalence of HIV and aids, which is estimated at 18 percent. Furthermore the country suffers from poverty, inequality and corruption (CIA, 2012). However, South Africa is working towards human development and in 2010 the country achieved the Millennium Development Goal (MDG), working towards eliminating extreme poverty, by halving the amount of people living on less than 1 USD a day (African Economic Outlook, 2011; South Africa MDG Report, 2010).

South Africa's history is tarred by racial divides and unfair distribution of the country's wealth. The 1994 multi-racial elections signalled the end of the apartheid policy which had separated the white minority and the black majority. However, there are still large imbalances in wealth, housing, education and other public services remain and some groups remain disadvantaged causing tensions that continue to lead to violence (CIA, 2012). Despite these issues South Africa is a middle-income emerging market with a stock exchange that is the 18th largest in the world. The country shares borders with Namibia, Botswana and Zimbabwe to the north, Swaziland to the east and has an inset

independent country of Lesotho. The southern boundaries of the country are coastal and lie on the South Atlantic and Indian Oceans. Tourism is a large part of the South African economy with many wildlife and nature parks, scenic landscapes and diverse culture (CIA, 2012). The FIFA World Cup in 2010 brought significant global attention to the country and boosted consumer spending which resulted in GDP growth (African Economic Outlook, 2011). The country is also rich in natural resources including gold and diamonds and its main trading partners are China, Germany and the US. In 2010 South Africa joined the BRICS of the world's leading emerging economies.[202] The aim of the country is build on these partnerships and increase productivity (African Economic Outlook, 2011).

The Johannesburg Stock Exchange (JSE) was established in 1887 and is the largest of the African stock exchanges. As of 2010 the exchange had 360 domestically listed companies, with a total market capitalisation of $1.01 trillion and offering the most advanced of products, including equities, bonds and derivatives. Although the economy is classed as a middle-income economy, the stock exchange, in terms of capitalisation, is only marginally smaller than that of the Stockholm exchange and nine other exchanges from economies classed as developed (African Securities Exchanges Association, 2012). The exchange transformed from an open outcry manual system to electronic based trading in 1996. The system was upgraded in 2007 and 2009, and there is a current settlement period of three days for bonds and five days for equities. In 2000 the JSE launched its first exchange-traded fund, which tracks the largest 40 companies listed on the exchange. A free-floating indexing system was launched in 2002 in conjunction with the FTSE. The purpose of this alliance has been to increase the attractiveness of the JSE to foreign investors by providing them with a familiar indexing system. In 2004, the exchange also launched its first socially responsible investment index, the SRI, which measures the

[202] BRICS is an acronym for its member countries and refers to an association between the world's leading emerging economies including Brazil, Russia, India, China and South Africa (Hervieu, 2011).

compliance of companies to key economic, environmental and social criteria (Johannesburg Stock Exchange, 2012). During 2009 the most active sectors within the JSE were mining, banks and mobile telecommunications. There are no specific regulations on market entry or exit for foreign investors. However, there are many forms of tax placed upon investors to the exchange. For example, non-residents will be charged a 0.25 percent Security Transfer tax along with 12 percent on royalty payments and 15 percent withholding tax to entertainers and sports persons.

Tunisia

Tunisia has a population of 10,700,000 and life expectancy is 73 for males and 77 for females. There are high levels of unemployment particularly in the education-leavers group. Levels of wealth are unevenly balanced with the coastal regions being significantly further developed than the central areas (CIA, 2012). The country looks set to meet all of its Millennium Development Goals by 2015 with less than 3 percent of people living below the poverty line in 2010 (African Economic Outlook, 2011). Covering an area of 163,610km^2, Tunisia is landscaped by northern mountains, central plateau, and semi-arid southern regions which lead into the Sahara. The country lies on the coast of the Mediterranean Sea to the north-east and borders Libya to the south-east and Algeria to the west. The country has been a tourist attraction for some time due to its location on the Mediterranean Sea and to traditional European holiday destinations of Italy and Malta. This has acted as a significant boost to the Tunisian economy (CIA Word Factbook, 2012).

Tunisia has suffered from political instability since gaining independence from France in 1956. In early 2011 protests at the high levels of poverty, unemployment and rising inflation forced Prime Minister Zine el Abidine Ben Ali out of power and into exile (African Economic Outlook, 2011). The revolution resulted in the first free elections since independence taking place in October 2011, where the public elected a constituent

government until general elections that are due to take place at a later date (CIA, 2012). The main sectors of the Tunisian economy include agriculture, mining and tourism. Agricultural products include olives, olive oil, tomatoes and grain, while the mining sector consists mainly of phosphate and iron ore. The revolution had a detrimental effect on the economy leading to a sharp drop in GDP growth, which reached the lowest level in ten years (African Economic Outlook 2011). The effects of the revolution have had a negative impact on both the level of tourism and the interest of foreign investors. However, Tunisia has free trade agreements with many countries in the EU, Arab League and other North African countries. Further, Tunisia is also a member of the Union for the Mediterranean which preserves links and promotes stability across 43 countries, including all the EU member states and others from North Africa, Middle East and the Balkans. With an optimistic approach to foreign trade and human development there is hope for the economic future of the country (African Economic Outlook 2011).

The Tunis Stock Exchange, founded in 1969, underwent several reforms in 1994 as the financial market was reorganised giving control of the market to the exchange, while operations are supervised by a separate regulatory body. These changes were put forward under the recognition that the new structure would allow for better adherence to international standards and at the same time providing greater investor protection through the new regulatory body. The exchange itself is run as a private entity and is owned by 23 brokerage firms within the market who have between them created a Market Guarantee Fund that guarantees the settlement of all transactions within the market. The exchange operates a trading day of 9:00am to 2:10pm and, since 1996, has been fully automated with an electronic trading system where settlement is done within three days. In 2005, the exchange launched a promotion strategy which recognised the importance of the stock exchange as a tool to develop the economy; the strategy aimed to raise awareness among businesses and investors of its services. Other key developments have included the

creation of an alternative investment market for small- and medium-sized companies in 2007 and the joining of the exchange to the World Federation of Exchanges in 2010. The exchange has 56 domestically listed companies in 2010 with a total market capitalisation of $10.682 billion and offers investors access to equity, cash and bond markets. During 2009, the most active sectors within the exchange were Finance, Consumer Services, Industry and Consumer Goods (African Securities Exchanges Association, 2009). There have also been some improvements in the possible investment ceilings within the exchange between 2000 and 2012. Although the exchange still imposes a 50 percent investment ceiling for listed stocks, from 2012, it has been possible for investors to gain authorisation from the Superior Investment Council to invest more than this amount. However the exchange does impose 20 percent withholding taxes on all bonds and various capital gains taxes if the investment is withdrawn within two years.

Appendix 4.1 Descriptive Statistics for Daily and Weekly Currency Exchanged Market Index Returns

Table 4.1.1A

Panel A: Sub-Period 1 Descriptive Statistics - Daily 02/01/1996 – 30/06/1997 and Weekly 02/01/1996 – 24/06/1997							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
Mean	0.0016 (0.0080)	-0.0001 (-0.0006)	-0.0003 (-0.0011)	0.0013 (0.0064)	0.0015 (0.0075)	-0.0004 (-0.0020)	0.0005 (0.0025)
StDev	0.0115 (0.0359)	0.0085 (0.0231)	0.0073 (0.0192)	0.0070 (0.0211)	0.0080 (0.0172)	0.0116 (0.0286)	0.0052 (0.0132)
Min	-0.0470 (-0.1179)	-0.0336 (-0.0415)	-0.0641 (-0.0527)	-0.0307 (-0.0651)	-0.0476 (-0.0296)	-0.0419 (-0.0741)	-0.0211 (-0.0332)
Max	0.0653 (0.1201)	0.0493 (0.1146)	0.0294 (0.0556)	0.0281 (0.0808)	0.0433 (0.0553)	0.0438 (0.0760)	0.0126 (0.0307)
Spread	0.1123 (0.2380)	0.0829 (0.1561)	0.0935 (0.1083)	0.0588 (0.1459)	0.0909 (0.0849)	0.0857 (0.1501)	0.0337 (0.0639)
Skew	0.8063*** (0.5646***)	0.6472*** (1.7585***)	-1.1509*** (0.2764***)	0.1843*** (0.6256***)	-0.0401*** (0.4462***)	-0.0725*** (-0.2528***)	-0.5352*** (-0.3985***)
Kurt	8.8087*** (6.0085***)	7.4670*** (9.8238***)	18.1240*** (3.5451***)	5.0700*** (5.6050***)	10.7332*** (3.5241***)	4.6247*** (3.4781***)	3.8520*** (3.0335***)
Jarque-Bera	589.04*** (33.13***)	350.59*** (189.08***)	3793.27*** (1.93)	71.65*** (26.79***)	969.40*** (3.44)	43.12*** (1.55)	30.34*** (2.04)
Panel B: Sub-Period 2 Descriptive Statistics - Daily 01/07/1997 – 29/12/1998 and Weekly 01/07/1997 – 29/12/1998							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
Mean	-0.0012 (-0.0063)	-0.0008 (-0.0042)	0.0001 (0.0000)	0.0006 (0.0026)	-0.0014 (-0.0073)	-0.0016 (-0.0080)	0.0005 (0.0024)
StDev	0.0115 (0.0297)	0.0113 (0.0299)	0.0080 (0.0225)	0.0062 (0.0182)	0.0091 (0.0206)	0.0228 (0.0615)	0.0108 (0.0275)
Min	-0.0429 (-0.0719)	-0.0519 (-0.1085)	-0.0383 (-0.0818)	-0.0191 (-0.0359)	-0.0670 (-0.0794)	-0.1443 (-0.2638)	-0.0323 (-0.0921)
Max	0.0406 (0.0935)	0.0506 (0.0924)	0.0437 (0.0735)	0.0200 (0.0703)	0.0351 (0.0444)	0.0802 (0.1300)	0.0376 (0.0513)
Spread	0.0835 (0.1654)	0.1025 (0.2009)	0.0820 (0.1553)	0.0391 (0.1062)	0.1021 (0.1238)	0.2245 (0.3938)	0.0699 (0.1434)
Skew	0.0897*** (0.5994***)	-0.2836*** (0.0620***)	0.2025*** (-0.4747***)	0.2316*** (0.8662***)	-0.7765*** (-0.3435***)	-0.9187*** (-1.1619***)	-0.1940*** (-1.1134***)
Kurt	5.2645*** (4.1206***)	5.7572*** (5.5316***)	6.8273*** (5.7257***)	3.3584*** (4.9931***)	10.2907*** (4.0225***)	8.4233*** (6.3856***)	4.0605*** (4.9633***)
Jarque-Bera	84.28*** (8.75**)	129.42*** (20.88***)	241.94*** (27.07***)	5.60*** (22.66***)	907.58*** (4.93*)	535.53*** (54.80***)	20.83*** (28.64***)

This table shows descriptive statistics for daily and weekly Currency exchanged market returns. Panel A shows sub-period one: 02/01/1996 to 30/06/1997 and Panel B shows sub-period two: 01/07/1997 to 31/12/1998. The weekly descriptive statistics are displayed in parentheses. The table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max). In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicated significance at the five percent level and *** indicates significance at the one percent level.

Table 4.1.2A

Panel A: Sub-Period 3 Descriptive Statistics - Daily 05/01/1999 – 07/03/2000 and Weekly 05/01/1999 – 07/03/2000								
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
Mean	0.0020 (0.0093)	-0.0013 (-0.0068)	-0.0002 (-0.0008)	-0.0006 (-0.0037)	0.0002 (0.0011)	0.0013 (0.0061)	0.0008 (0.0040)	0.0005 (0.0023)
StDev	0.0180 (0.0416)	0.0088 (0.0222)	0.0063 (0.0176)	0.0063 (0.0165)	0.0120 (0.0402)	0.0158 (0.0363)	0.0071 (0.0209)	0.0102 (0.0217)
Min	-0.0454 (-0.0841)	-0.0394 (-0.0556)	-0.0207 (-0.0505)	-0.0236 (-0.0614)	-0.0444 (-0.1143)	-0.0745 (-0.0782)	-0.0390 (-0.0223)	-0.0316 (-0.0375)
Max	0.0766 (0.1009)	0.0333 (0.0594)	0.0290 (0.0378)	0.0283 (0.0423)	0.0384 (0.1254)	0.0740 (0.0781)	0.0404 (0.0847)	0.0282 (0.0457)
Spread	0.1220 (0.1850)	0.0727 (0.1150)	0.0497 (0.0883)	0.0519 (0.1037)	0.0828 (0.2397)	0.1485 (0.1563)	0.0794 (0.1070)	0.0598 (0.0832)
Skew	0.8938*** (0.1684***)	-0.5192*** (0.7030***)	0.1039*** (-0.2981***)	0.1435*** (-0.3165***)	-0.3882*** (0.0435***)	0.0375*** (0.0540***)	0.8398*** (1.9739***)	-0.1447*** (-0.0426***)
Kurt	5.1944*** (2.8471***)	5.8522*** (4.1733***)	4.5513*** (3.3051***)	6.0333*** (5.2149***)	4.3088*** (4.2351***)	5.6925*** (2.4093***)	10.5027*** (8.1079***)	3.0131*** (2.1770***)
Jarque-Bera	103.48*** (0.35)	119.00*** (8.52**)	31.64*** (1.14)	119.91*** (13.49***)	29.91*** (3.90)	93.71*** (0.92)	763.53*** (105.92***)	1.08 (1.74)
Panel B: Sub-Period 4 Descriptive Statistics - Daily 14/03/2000 – 15/10/2002 and Weekly 14/03/2000 – 15/10/2002								
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
Mean	-0.0018 (-0.0093)	-0.0012 (-0.0060)	-0.0004 (-0.0019)	-0.0008 (-0.0041)	0.0009 (0.0045)	-0.0005 (-0.0024)	-0.0003 (-0.0014)	-0.0008 (-0.0034)
StDev	0.0178 (0.0423)	0.0087 (0.0178)	0.0063 (0.0149)	0.0095 (0.0259)	0.0147 (0.0416)	0.0161 (0.0365)	0.0067 (0.0162)	0.0127 (0.0287)
Min	-0.0672 (-0.1468)	-0.0713 (-0.0555)	-0.0264 (-0.0332)	-0.0508 (-0.0748)	-0.0566 (-0.1434)	-0.0916 (-0.1119)	-0.0271 (-0.0410)	-0.0535 (-0.1185)
Max	0.0708 (0.0883)	0.0502 (0.0530)	0.0314 (0.0360)	0.0616 (0.0790)	0.0754 (0.1778)	0.0577 (0.0819)	0.0467 (0.0421)	0.0434 (0.0912)
Spread	0.1380 (0.2351)	0.1215 (0.1085)	0.0578 (0.0692)	0.1124 (0.1538)	0.1320 (0.3212)	0.1493 (0.1938)	0.0738 (0.0831)	0.0969 (0.2097)
Skew	-0.1086*** (-0.1986***)	-0.9311*** (-0.0714***)	-0.0310*** (0.1994***)	1.0472*** (0.6317***)	0.3302*** (0.6046***)	-0.3595*** (-0.3036***)	0.4071*** (0.2172***)	-0.3791*** (-0.9104***)
Kurt	4.4210*** (3.1705***)	12.5209*** (3.9559***)	4.6237*** (2.6772***)	11.2755*** (4.5819***)	6.1097*** (5.8770***)	5.2065*** (3.0205***)	7.0987*** (3.2025***)	4.9085*** (6.9313***)
Jarque-Bera	57.86*** (1.05)	2635.21*** (5.25*)	73.92*** (1.48)	2040.37*** (23.05***)	282.98*** (54.78***)	150.80*** (2.08)	488.93*** (1.29)	118.08*** (105.58***)

This table shows descriptive statistics for daily and weekly Currency exchanged market returns. Panel A shows sub-period three: 01/01/1999 to 10/03/2000 and Panel B shows sub-period four: 13/03/2000 to 09/10/2002. The weekly descriptive statistics are displayed in parentheses. The table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max). In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicated significance at the five percent level and *** indicates significance at the one percent level.

Table 4.1.3A

Panel A: Sub-Period 5 Descriptive Statistics - Daily 22/10/2002 – 08/03/2005 and Weekly 22/10/2002 – 08/03/2005									
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
Mean	0.0000 (-0.0003)	0.0028 (0.0136)	0.0016 (0.0076)	0.0008 (0.0038)	0.0005 (0.0027)	0.0006 (0.0028)	0.0011 (0.0050)	0.0001 (0.0004)	0.0005 (0.0020)
StDev	0.0067 (0.0128)	0.0186 (0.0420)	0.0158 (0.0386)	0.0073 (0.0176)	0.0080 (0.0207)	0.0139 (0.0389)	0.0116 (0.0255)	0.0054 (0.0132)	0.0095 (0.0191)
Max	0.0292 (0.0284)	0.0929 (0.1538)	0.1491 (0.2240)	0.0354 (0.0553)	0.0465 (0.0681)	0.1038 (0.1624)	0.0424 (0.0676)	0.0214 (0.0483)	0.0509 (0.0756)
Min	-0.0350 (-0.0297)	-0.0946 (-0.0999)	-0.1197 (-0.1846)	-0.0257 (-0.0342)	-0.0311 (-0.0576)	-0.1028 (-0.1341)	-0.0350 (-0.0809)	-0.0166 (-0.0368)	-0.0436 (-0.0664)
Spread	0.0642 (0.0581)	0.1875 (0.2537)	0.2688 (0.4086)	0.0611 (0.0895)	0.0776 (0.1257)	0.2066 (0.2965)	0.0774 (0.1485)	0.0380 (0.0851)	0.0945 (0.1420)
Skew	-0.1655*** (0.0314***)	0.5192*** (0.1280***)	0.4474*** (0.5733***)	0.2720*** (0.1299***)	0.1041*** (-0.0749***)	0.0143*** (0.4254***)	-0.0879*** (-0.3430***)	0.1939*** (0.0773***)	0.3304*** (-0.1637***)
Kurt	6.5271*** (2.5458***)	6.8228*** (3.7219***)	24.5575*** (14.4036***)	4.6955*** (2.6540***)	5.9538*** (3.6220***)	12.3044*** (5.4678***)	3.1724*** (3.1126***)	3.6765*** (4.1747***)	7.0878*** (5.6802***)
Jarque-Bera	328.92*** (1.09)	411.27*** (3.03)	12200.72*** (678.68***)	83.10*** (0.97)	229.80*** (2.11)	2268.93*** (35.21***)	1.59 (2.50)	15.94*** (7.25**)	449.40*** (37.67***)
Panel B: Sub-Period 6 Descriptive Statistics - Daily 10/03/2005 – 08/08/2007 and Weekly 15/03/2005 – 31/07/2007									
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
Mean	0.0018 (0.0091)	0.0010 (0.0050)	0.0009 (0.0045)	0.0009 (0.0044)	0.0014 (0.0064)	0.0018 (0.0090)	0.0006 (0.0034)	0.0009 (0.0040)	0.0005 (0.0022)
StDev	0.0081 (0.0173)	0.0172 (0.0455)	0.0097 (0.0286)	0.0089 (0.0225)	0.0110 (0.0336)	0.0115 (0.0321)	0.0162 (0.0332)	0.0054 (0.0149)	0.0072 (0.0139)
Max	0.0950 (0.0807)	0.0740 (0.1069)	0.0404 (0.1145)	0.0509 (0.0861)	0.0404 (0.0858)	0.0405 (0.1114)	0.0709 (0.0936)	0.0203 (0.0398)	0.0287 (0.0386)
Min	-0.0362 (-0.0291)	-0.0950 (-0.1764)	-0.0364 (-0.0712)	-0.0490 (-0.0654)	-0.0532 (-0.1405)	-0.0429 (-0.0754)	-0.0805 (-0.1284)	-0.0224 (-0.0472)	-0.0317 (-0.0461)
Spread	0.1312 (0.1098)	0.1690 (0.2833)	0.0768 (0.1857)	0.0999 (0.1515)	0.0936 (0.2263)	0.0834 (0.1868)	0.1514 (0.2220)	0.0427 (0.0870)	0.0604 (0.0847)
Skew	3.0556*** (1.1479***)	-0.4266*** (-0.7835***)	0.0085*** (0.5338***)	0.2892*** (0.5929***)	-0.4225*** (-0.9973***)	-0.0114*** (0.4976***)	-0.6356*** (-0.7715***)	0.0817*** (-0.0802***)	-0.4801*** (-0.5847***)
Kurt	34.0752*** (6.3615***)	7.4588*** (4.8607***)	4.5795*** (4.8931***)	8.2380*** (4.6877***)	5.5116*** (6.8130***)	4.2938*** (3.5944***)	5.4796*** (4.5152***)	4.0190*** (3.6562***)	5.5039*** (3.8498***)
Jarque-Bera	26287.37*** (85.61***)	540.11*** (30.58***)	65.39*** (24.41***)	727.84*** (21.98***)	184.04*** (95.67***)	43.89*** (6.94**)	203.50*** (24.16***)	27.92*** (2.36)	188.48*** (10.80***)

This table shows descriptive statistics for daily and weekly Currency exchanged market returns. Panel A shows sub-period five: 10/10/2002 to 09/03/2005 and panel B shows sub-period six: 10/03/2005 to 08/08/2007. The weekly descriptive statistics are displayed in parentheses. The table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max). In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicated significance at the five percent level and *** indicates significance at the one percent level.

Table 4.1.4A

Sub-Period 7 Descriptive Statistics - Daily 09/08/2007 – 28/12/2010 and Weekly 07/08/2007 – 28/12/2010									
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
Mean	-0.0002 (-0.0009)	0.0001 (0.0007)	-0.0001 (-0.0006)	0.0006 (0.0029)	0.0002 (0.0012)	-0.0008 (-0.0039)	0.0006 (0.0031)	0.0010 (0.0048)	0.0000 (-0.0003)
StDev	0.0093 (0.0218)	0.0201 (0.0482)	0.0153 (0.0410)	0.0141 (0.0319)	0.0122 (0.0313)	0.0177 (0.0561)	0.0215 (0.0495)	0.0084 (0.0188)	0.0162 (0.0323)
Max	0.0408 (0.0652)	0.1044 (0.1123)	0.0767 (0.1705)	0.0732 (0.1109)	0.0426 (0.0859)	0.0589 (0.1732)	0.0810 (0.2167)	0.0403 (0.0761)	0.0881 (0.1658)
Min	-0.0466 (-0.0824)	-0.1864 (-0.2026)	-0.1024 (-0.1548)	-0.0783 (-0.1276)	-0.0814 (-0.1999)	-0.0957 (-0.2179)	-0.1225 (-0.2148)	-0.0404 (-0.0531)	-0.0871 (-0.0838)
Spread	0.0874 (0.1476)	0.2908 (0.3149)	0.1791 (0.3253)	0.1515 (0.2385)	0.1240 (0.2858)	0.1546 (0.3911)	0.2035 (0.4315)	0.0807 (0.1292)	0.1752 (0.2496)
Skew	-0.1969*** (-0.4369***)	-1.1427*** (-1.1576***)	-0.1656*** (0.2155***)	-0.2805*** (-0.1642***)	-0.6632*** (-1.4295***)	-0.3745*** (-0.7085***)	-0.3116*** (-0.4246***)	0.1245*** (0.0253***)	-0.1016*** (0.3326***)
Kurt	6.2367*** (4.3142***)	13.4453*** (5.6448***)	9.8142*** (5.9046***)	7.1647*** (4.8502***)	7.2719*** (12.2342***)	5.9111*** (6.2543***)	6.2408*** (7.0269***)	5.6622*** (3.9171***)	8.0095*** (6.3122***)
Jarque-Bera	391.15*** (18.37***)	4206.32*** (91.12***)	1712.42*** (63.59***)	649.73*** (26.04***)	736.13*** (689.14***)	332.43*** (92.91***)	400.69*** (124.91***)	263.03*** (6.22**)	924.82*** (84.17***)

This table shows the descriptive statistics for daily and weekly UK Sterling converted market returns in sub-period seven: 09/08/2007 to 28/12/2010. The weekly descriptive statistics are displayed in parentheses. The table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max). In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicated significance at the five percent level and *** indicates significance at the one percent level.

Appendix 4.2 Currency Exchanged Daily Unit Root Tests

Table 4.2.1A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data over the Whole Period 02/01/1996 – 28/12/2010

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-1.7124	-0.4465	0.7370	-1.7226	-0.4533	0.7282
KEN	-1.8870	-1.5960	-0.6942	-1.9148	-1.6220	-0.7235
MAU	-0.7863	1.5044	2.4856	-0.845	1.4269	2.3977
MOR	-1.3700	-0.5262	1.0579	-1.2933	-0.4459	1.1639
NIG	-1.2977	-1.2007	-0.1877	-1.3151	-1.2113	-0.1963
SAF	-1.5865	0.6649	1.3276	-1.3875	0.7940	1.4605
UK	-2.2874	-2.2472	0.3398	-2.1824	-2.1509	0.3489
First Difference						
EGY	-59.6807***	-59.6809***	-59.6607***	-59.7051***	-59.7075***	-59.6969***
KEN	-51.1369***	-51.1096***	-51.1157***	-51.3157***	-51.3252***	-51.3313***
MAU	-58.6290***	-58.5372***	-58.4801***	-58.7504***	-58.7164***	-58.6919***
MOR	-50.5737***	-50.5749***	-50.5479***	-50.0532***	-50.0586***	-50.1152***
NIG	-28.5188***	-28.5182***	-28.5127***	-41.3230***	-41.3377***	-41.2922***
SAF	-45.1948***	-45.1169***	-45.1001***	-59.4452***	-59.3691***	-59.3568***
UK	-31.9636***	-31.9667***	-31.9590***	-63.6278***	-63.6353***	-63.7019***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices over the whole period 02/01/1996 – 28/12/2010. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.2A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 1: 02/01/1996 – 30/06/1997

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-1.4940	-0.2409	1.5322	-1.6212	-0.3732	1.2611
KEN	-2.4765	-1.6882	-0.3046	-2.5654	-1.9185	-0.2864
MAU	-0.9624	-1.3905	-0.6515	-1.1784	-1.4356	-0.7257
MOR	-1.6087	-0.6891	1.8433	-1.6217	-0.5495	1.9336
NIG	-1.3393	-0.5979	3.2064	-1.4032	-0.6026	3.1177
SAF	-1.2489	-1.3749	-0.8355	-1.3156	-1.3990	-0.8164
UK	-2.4478	-0.4846	1.8244	-2.6783	-0.5841	1.7072
First Difference						
EGY	-14.5299***	-14.5325***	-14.3955***	-15.3282***	-15.3385***	-15.3064***
KEN	-19.3541***	-19.2168***	-19.2410***	-19.5608***	-19.4828***	-19.5039***
MAU	-10.7464***	-10.7282***	-10.7248***	-19.3821***	-19.3887***	-19.3979***
MOR	-9.7504***	-9.7659***	-9.5232***	-17.0396***	-17.0562***	-17.1063***
NIG	-20.7813***	-20.8053***	-20.2092***	-20.7548***	-20.7772***	-20.4838***
SAF	-18.4363***	-18.4122***	-18.4010***	-18.4185***	-18.3943***	-18.3822***
UK	-18.0821***	-18.0958***	-17.9823***	-18.0473***	-18.0632***	-18.0316***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 1 02/01/1996 – 30/06/1997. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.3A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 2: 01/07/1997 – 31/12/1998

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-2.4980	-0.4504	-2.0162**	-2.6077	-0.4669	-1.9852**
KEN	-3.0407	-2.9962**	-1.5096	-3.2889	-2.9917**	-1.3920
MAU	-1.9618	-1.8766	0.1768	-1.9081	-1.7513	0.0350
MOR	-0.7469	-1.0802	1.3585	-1.0384	-1.1026	1.1348
NIG	-1.3933	-2.2264***	-3.6572	-1.4551	-2.1870***	-3.5207
SAF	-1.8563	-0.8558	-1.5829	-1.7843	-0.9138	-1.5829
UK	-1.8595	-1.8474	0.5519	-1.7353	-1.7661	0.6365
First Difference						
EGY	-17.8666***	-17.8860***	-17.7511***	-17.7778***	-17.7993***	-17.6862***
KEN	-16.8360***	-16.7468***	-16.6894***	-17.3062***	-17.2471***	-17.2275***
MAU	-11.2967***	-11.3069***	-11.3193***	-17.7141***	-17.7350***	-17.7547***
MOR	-17.2253***	-17.2128***	-17.1218***	-17.7439***	-17.7581***	-17.7910***
NIG	-20.1625***	-20.0033***	-19.4833***	-20.1668***	-20.0356***	-19.8389***
SAF	-17.4024***	-17.4248***	-17.3647***	-17.3977***	-17.4201***	-17.3661***
UK	-16.8254***	-16.8382***	-16.8349***	-16.6887***	-16.7036***	-16.7040***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 2 01/07/1997 – 31/12/1998. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.4A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 3: 01/01/1999 – 10/03/2000

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-1.5314	-0.9243	1.5695	-1.6407	-0.9807	1.4743
KEN	-0.9271	-1.1077	-2.8330***	-1.1379	-1.0981	-2.5524**
MAU	-1.7755	-2.2549	-0.7611	-1.9268	-2.3494	-0.6590
MOR	-1.8528	-0.8024	-1.5462	-1.8297	-0.5897	-1.4887
NIG	-1.7758	-1.6590	0.1474	-2.0987	-2.0053	-0.0154
SAF	-2.6621	-1.6142	1.0073	-2.5289	-1.5468	1.0758
TUN	-3.1482	-2.4707	0.6295	-3.1974	-2.3950	0.8038
UK	-2.8160	-2.2570	0.8171	-2.7820	-2.1719	0.9062
First Difference						
EGY	-16.5437***	-16.5707***	-16.4495***	-16.5478***	-16.5748***	-16.4654***
KEN	-14.7705***	-14.7612***	-14.4892***	-14.6531***	-14.6520***	-14.4727***
MAU	-11.3379***	-11.2407***	-11.2494***	-16.3878***	-16.3089***	-16.3132***
MOR	-14.2446***	-14.2650***	-14.1574***	-14.2159***	-14.2365***	-14.1680***
NIG	-11.5222***	-11.4780***	-11.4927***	-11.8770***	-11.8345***	-11.8506***
SAF	-15.1321***	-15.1444***	-15.0819***	-15.0949***	-15.1075***	-15.0684***
TUN	-16.5863***	-16.6104***	-16.6073***	-16.8014***	-16.8232***	-16.7623***
UK	-16.1768***	-16.2019***	-16.1871***	-16.1615***	-16.1899***	-16.1595***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 3 01/01/1999 – 10/03/2000. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.5A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 4: 13/03/2000 – 09/10/2002

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-2.6937	-2.2722	-3.1007***	-2.8944	-2.2175	-2.9181***
KEN	-2.4588	0.0105	-3.1585***	-2.5126	0.0138	-3.1504***
MAU	-1.6851	-1.0239	-1.6753	-2.2176	-1.1500	-1.4015
MOR	-3.2456	-0.5518	-1.8452	-3.4195**	-0.5525	-1.7843
NIG	-1.3546	-2.0146	0.6235	-1.3252	-2.0721	0.6723
SAF	-2.4524	-1.8269	-1.0013	-2.4281	-1.6850	-0.9283
TUN	-2.8718	-0.0080	-1.1686	-2.7467	0.2067	-1.2464
UK	-2.5216	-0.0873	-1.6076	-2.4210	0.1213	-1.7298
First Difference						
EGY	-26.9105***	-26.8277***	-16.9657***	-26.9558***	-26.9106***	-26.7818***
KEN	-26.2387***	-26.2484***	-25.8532***	-26.2365***	-26.2461***	-25.9355***
MAU	-25.2033***	-25.2160***	-25.1423***	-25.7384***	-25.7509***	-25.7373***
MOR	-22.3940***	-22.4049***	-22.2980***	-22.4579***	-22.4690***	-22.4440***
NIG	-22.2755***	-22.2002***	-22.1726***	-22.1509***	-22.1344***	-22.1398***
SAF	-23.8320***	-23.8473***	-23.8396***	-23.8374***	-23.8528***	-23.8504***
TUN	-25.5624***	-25.4971***	-25.4661***	-25.6663***	-25.5691***	-25.5295***
UK	-20.1726***	-20.1375***	-20.0341***	-25.6119***	-25.5405***	-25.3944***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 4 13/03/2000 – 09/10/2002. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.6A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 5: 10/10/2002 – 09/03/2005

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-2.8927	-0.9059	1.4169	-2.7844	-0.7741	1.6527
EGY	2.9302	4.4378	4.5282	3.7361	5.6953	5.7730
KEN	-2.2733	-2.0137	1.3211	-2.1807	-2.0026	1.4385
MAU	-1.8974	-1.6029	2.2688	-1.9800	-1.6029	2.2283
MOR	-2.0207	-2.0358	0.9389	-2.0401	-2.0456	0.9455
NIG	-0.5428	-1.3878	0.3565	-0.5114	-1.3821	0.3659
SAF	-1.9729	-0.0974	2.4457	-1.9553	-0.0951	2.4522
TUN	-4.2078	-3.5415	0.6131	-4.3121	-3.5388	0.6430
UK	-2.8927	-0.9059	1.4169	-2.7844	-0.7741	1.6527
First Difference						
BOT	-29.1962***	-29.2063***	-29.1287***	-29.4019***	-29.2972***	-29.1138***
EGY	-8.2650***	-7.0336***	-6.5335***	-26.7923***	-26.7471***	-26.8970***
KEN	-22.4607***	-22.4520***	-22.3435***	-22.3387***	-22.3356***	-22.2524***
MAU	-24.2157***	-24.1952***	-23.9799***	-24.2232***	-24.1948***	-24.0123***
MOR	-20.4689***	-20.4304***	-20.3915***	-20.5385***	-20.5252***	-20.5150***
NIG	-14.7534***	-14.6857***	-14.6755***	-18.7433***	-18.7712***	-18.7894***
SAF	-25.0190***	-25.0189***	-24.8052***	-25.0190***	-25.0189***	-24.8048***
TUN	-26.7756***	-26.7794***	-26.7778***	-26.7856***	-26.7898***	-26.7884***
UK	-29.1962***	-29.2063***	-29.1287***	-29.4019***	-29.2972***	-29.1138***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 5 10/10/2002 – 09/03/2005. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.7A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 6: 10/03/2005 – 08/08/2007

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-3.2718	-1.2343	1.3648	-3.3255	-1.2120	1.4281
EGY	-1.7766	-1.5044	1.0588	-1.9374	-1.5830	0.9354
KEN	-2.5643	-1.8403	0.8858	-2.2337	-1.7183	1.0962
MAU	-1.3497	0.7283	2.2964	-1.2309	0.8918	2.4551
MOR	-3.0385	-0.5739	1.7083	-2.6891	-0.4460	2.0690
NIG	-1.1672	0.9073	3.1824	-1.2813	0.8657	3.1667
SAF	-1.8128	-1.5147	0.5866	-1.8303	-1.4877	0.6238
TUN	-2.4919	-2.2135	0.6719	-2.6199	-2.2211	0.6244
UK	-3.2718	-1.2343	1.3648	-3.3255	-1.2120	1.4281
First Difference						
BOT	-25.6590***	-25.6744***	-25.6033***	-25.6715***	-25.6862***	-25.6008***
EGY	-24.6687***	-24.6825***	-24.6317***	-24.7630***	-24.7773***	-24.7439***
KEN	-12.8477***	-12.8320***	-12.7709***	-17.9595***	-17.9777***	-17.9722***
MAU	-20.9135***	-20.8396***	-20.6601***	-20.8106***	-20.7516***	-20.6499***
MOR	-18.1772***	-18.1892***	-18.0488***	-17.6833***	-17.6973***	-17.7160***
NIG	-15.1153***	-15.0417***	-14.6325***	-15.7540***	-15.8629***	-16.0236***
SAF	-24.5956***	-24.6098***	-24.6022***	-24.5969***	-24.6116***	-24.6026***
TUN	-29.1169***	-29.1190***	-29.1169***	-29.3028***	-29.2951***	-29.2851***
UK	-25.6590***	-25.6744***	-25.6033***	-25.6715***	-25.6862***	-25.6008***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 6 10/03/2005 – 08/08/2007. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.2.8A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Sterling Converted Daily Data Sub-Period 7: 09/08/2007 – 28/12/2010

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-1.3773	-1.6649	-0.3527	-1.1967	-1.5399	-0.3451
EGY	-1.5411	-1.5001	-0.0574	-1.5841	-1.5425	-0.0801
KEN	-1.5019	-1.6786	-0.5141	-1.3514	-1.5061	-0.5002
MAU	-1.0949	-0.8193	1.1907	-1.1872	-0.9111	1.1009
MOR	-2.8109	-2.6779	0.1792	-2.7553	-2.6207	0.2331
NIG	-1.6796	-1.1773	-1.2185	-0.8724	-0.7593	-1.5292
SAF	-1.4763	-0.1957	1.0451	-1.3574	-0.0141	1.1781
TUN	-1.5053	-1.2487	0.2539	-1.7849	-1.5666	0.1733
UK	-1.3773	-1.6649	-0.3527	-1.1967	-1.5399	-0.3451
First Difference						
BOT	-32.1428***	-32.1018***	-32.1202***	-32.3348***	-32.2677***	-32.2870***
EGY	-28.0239***	-28.0398***	-28.0542***	-28.0412***	-28.0569***	-28.0714***
KEN	-23.6705***	-23.6622***	-23.6741***	-23.5093***	-23.5101***	-23.5231***
MAU	-28.1601***	-28.1722***	-28.1325***	-28.1565***	-28.1687***	-28.1373***
MOR	-24.4726***	-24.4759***	-24.4835***	-24.2219***	-24.2312***	-24.2431***
NIG	-14.4740***	-14.4793***	-14.4588***	-18.9138***	-18.9237***	-18.9257***
SAF	-28.2825***	-28.2521***	-28.2263***	-28.3996***	-28.3072***	-28.2430***
TUN	-25.3400***	-25.2938***	-25.3032***	-36.7398***	-36.6550***	-36.6676***
UK	-32.1428***	-32.1018***	-32.1202***	-32.3348***	-32.2677***	-32.2870***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the daily currency exchanged prices in sub-period 7 09/08/2007 – 28/12/2010. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Appendix 4.3 Currency Exchanged Weekly Unit Root Tests

Table 4.3.1A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data over the Whole Period 02/01/1996 – 28/12/2010

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-1.8015	-0.5280	0.6273	-1.8351	-0.5513	0.6192
KEN	-1.9532	-1.6777	-0.7051	-1.9434	-1.6755	-0.7313
MAU	-0.7258	1.6230	2.6064	-1.0057	1.1065	2.0607
MOR	-1.3202	-0.4719	1.1255	-1.2236	-0.3723	1.2675
NIG	-2.0137	-1.5769	-0.5692	-1.7898	-1.4471	-0.4429
SAF	-1.5127	0.6344	1.3447	-1.4148	0.7636	1.4372
UK	-2.1801	-2.1505	0.4004	-2.1247	-2.0901	0.4748
First Difference						
EGY	-14.3972***	-14.3903***	-14.3402***	-28.9914***	-28.9942***	-28.9563***
KEN	-25.3224***	-25.2738***	-25.2892***	-25.2956***	-25.2738***	-25.2892***
MAU	-25.9610***	-25.7653***	-25.6506***	-26.1985***	-26.2234***	-26.2052***
MOR	-22.1479***	-22.1460***	-22.0582***	-28.3135***	-28.3186***	-28.2453***
NIG	-8.1780***	-8.1763***	-8.1677***	-29.9191***	-29.9359***	-29.9521***
SAF	-30.4655***	-30.2732***	-30.2393***	-30.4256***	-30.1907***	-30.1565***
UK	-29.9485***	-29.9654***	-29.9604***	-29.9554***	-29.9716***	-29.9390***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices over the whole period 02/01/1996 – 28/12/2010. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.2A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 1: 02/01/1996 – 24/06/1997

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-2.4522	-0.3101	1.3823	-1.8727	-0.6394	0.8175
KEN	-2.6061	-2.0098	-0.3659	-2.6154	-2.0915	-0.3611
MAU	-0.9687	-1.3664	-0.6376	-1.0183	-1.4251	-0.5999
MOR	-3.0590	-0.7392	2.2319	-1.8579	-0.5989	1.6749
NIG	-3.4669	-0.5908	3.1746	-2.0266	-0.7056	2.1649
SAF	-1.3885	-1.4186	-0.7911	-1.5518	-1.4810	-0.7580
UK	-2.7969	-0.6113	1.5903	-2.7003	-0.4808	1.8822
First Difference						
EGY	-3.9860***	-4.0285***	-3.9365***	-7.1535***	-7.1862***	-7.0860***
KEN	-7.8444***	-7.7217***	-7.7724***	-7.8079***	-7.7039***	-7.7554***
MAU	-7.9427***	-7.8067***	-7.8255***	-7.9120***	-7.8062***	-7.8315***
MOR	-6.5660***	-6.6206***	-6.3034***	-6.5660***	-6.6206***	-6.3048***
NIG	-6.5063***	-6.5533***	-5.9628***	-6.9186***	-6.9554***	-6.4242***
SAF	-9.0018***	-8.8820***	-8.8266***	-9.0483***	-8.8820***	-8.8526***
UK	-10.1632***	-10.2026***	-9.8504***	-10.1434***	-10.1770***	-9.8428***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 1 02/01/1996 – 24/06/1997. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.3A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 2: 01/07/1997 – 29/12/1998

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-2.8907	-0.5217	-1.7932	-3.0020	-0.4909	-1.8542
KEN	-3.2762	-2.5435	-1.0521	-3.3821	-2.9437	-1.5664
MAU	-1.8044	-1.7706	-0.1031	-2.2915	-2.1586	-0.1215
MOR	-0.9138	-1.1203	1.0739	-1.1749	-1.1580	0.9534
NIG	-1.3866	-2.1857	-3.7108***	-1.6078	-2.0290	-3.1945***
SAF	-2.0304	-1.0380	-1.3871	-2.1274	-1.0258	-1.4186
UK	-1.8598	-1.8445	0.6177	-1.8005	-1.7892	0.6830
First Difference						
EGY	-10.6156***	-10.6503***	-10.2768***	-10.4552***	-10.4796***	-10.1425***
KEN	-7.2442***	-7.2194***	-7.1957***	-7.1872***	-7.1574***	-7.1362***
MAU	-8.3001***	-8.3297***	-8.3842***	-8.4167***	-8.4496***	-8.4980***
MOR	-8.2423***	-8.1937***	-8.0747***	-8.2648***	-8.2261***	-8.1243***
NIG	-7.1987***	-7.0130***	-6.3914***	-7.1835***	-7.0514***	-6.5527***
SAF	-10.0364***	-10.0946***	-9.9739***	-9.9558***	-10.0089***	-9.8895***
UK	-9.9011***	-9.9405***	-9.9230***	-9.8841***	-9.9209***	-9.9022***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 2 01/07/1997 – 29/12/1998. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.4A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 3: 05/01/1999 – 07/03/2000

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-1.5169	-0.7399	1.4365	-1.5292	-0.7195	1.5643
KEN	-0.9824	-1.3662	-2.6034**	-0.8898	-1.4024	-2.8179***
MAU	-1.7656	-2.1417	-0.4739	-1.7955	-2.1417	-0.4622
MOR	-1.6169	-0.4705	-1.7164	-1.6169	-0.4425	-1.7651
NIG	-2.6342	-2.6080	-0.0232	-2.2968	-2.2763	0.0063
SAF	-2.3784	-1.4995	1.0029	-2.3784	-1.4617	1.1081
TUN	-3.0798	-2.5010	0.4396	-3.1099	-2.4151	0.4847
UK	-2.7312	-2.2593	0.7307	-2.7944	-2.2593	0.7853
First Difference						
EGY	-8.4774***	-8.5279***	-8.2576***	-8.4790***	-8.5262***	-8.2390***
KEN	-9.7741***	-9.1708***	-8.0246***	-9.5949***	-9.0412***	-7.9929***
MAU	-7.7444***	-7.3511***	-7.3654***	-7.7401***	-7.3624***	-7.3654***
MOR	-7.4261***	-7.4728***	-7.1793***	-7.4217***	-7.4742***	-7.1794***
NIG	-5.6487***	-5.6515***	-5.6961***	-5.6288***	-5.6318***	-5.6770***
SAF	-7.6176***	-7.6792***	-7.6188***	-7.6269***	-7.6920***	-7.6282***
TUN	-8.5791***	-8.6330***	-8.6602***	-8.5939***	-8.6479***	-8.7949***
UK	-8.2689***	-8.3548***	-8.3415***	-8.2678***	-8.3548***	-8.3415***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 3 05/01/1999 – 07/03/2000. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.5A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 4: 14/03/2000 – 15/10/2002

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
EGY	-2.9349	-2.3713	-3.1266***	-2.6403	-3.3447**	-5.2064***
KEN	-2.3244	-0.0219	-3.4222***	-2.4232	-0.0219	-3.2950***
MAU	-2.5979	-1.1778	-1.1059	-2.1955	-1.1649	-1.6147
MOR	-4.3659***	-0.6101	-1.8010	-3.6703	-0.7004	-1.7045
NIG	-1.5913	-2.0431	0.5586	-1.3240	-2.0532	0.7429
SAF	-2.3929	-1.8511	-0.9376	-2.7080	-2.1022	-0.9376
TUN	-3.3798	-0.3388	-1.0122	-3.4116	-0.2520	-1.0481
UK	-2.8821	-0.5585	-1.4854	-2.8967	-0.2546	-1.8396
First Difference						
EGY	-9.7698***	-9.6698***	-9.3743***	-12.0674***	-9.8108***	-9.1869***
KEN	-10.7598***	-10.7751***	-10.0228***	-10.7598***	-10.7751***	-10.1408***
MAU	-8.4780***	-8.5085***	-8.4537***	-8.3364***	-8.3677***	-8.3592***
MOR	-11.0570***	-11.0894***	-6.7282***	-11.0903***	-11.1220***	-10.8988***
NIG	-13.1913***	-13.0025***	-12.9373***	-13.7350***	-13.1200***	-12.9842***
SAF	-10.3826***	-10.4197***	-10.4258***	-10.4398***	-10.4969***	-10.5035***
TUN	-12.8024***	-12.7934***	-12.6756***	-12.7910***	-12.7473***	-12.6131***
UK	-12.6617***	-12.6815***	-12.4922***	-12.8148***	-12.7435***	-12.4738***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 4 14/03/2000 – 15/10/2002. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.6A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 5: 22/10/2002 – 08/03/2005

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-3.0740	-0.2888	1.2735	-2.8983	-0.0248	1.5647
EGY	3.0397	5.3747	6.0923	2.9961	5.0534	5.2977
KEN	-2.2638	-2.1251	1.3214	-2.2518	-2.1299	1.4029
MAU	-1.9512	-1.5393	1.9988	-1.8759	-1.5679	2.1321
MOR	-2.0275	-2.2033	1.0470	-2.1621	-2.2026	1.0023
NIG	-0.5493	-1.3919	0.3301	-0.4913	-1.3882	0.3378
SAF	-1.9773	0.1712	2.2953	-1.9075	0.2059	2.2953
TUN	-3.4540	-2.4442	0.3775	-3.2605	-2.1418	0.6500
UK	-3.0740	-0.2888	1.2735	-2.8983	-0.0248	1.5647
First Difference						
BOT	-12.4198***	-12.4271***	-12.2335***	-12.7600***	-12.6100***	-12.3772***
EGY	-8.7294***	-7.7564***	-7.0591***	-8.7438***	-7.9977***	-7.5978***
KEN	-11.4205***	-11.3809***	-11.1349***	-11.4415***	-11.3950***	-11.1349***
MAU	-11.4686***	-11.4009***	-10.9610***	-11.5768***	-11.4417***	-10.9610***
MOR	-9.9063***	-9.8079***	-9.7317***	-9.8436***	-9.7421***	-9.6761***
NIG	-11.9667***	-11.7901***	-11.7813***	-11.9666***	-11.7700***	-11.7598***
SAF	-11.4553***	-11.4521***	-10.9747***	-11.4541***	-11.4695***	-10.9764***
TUN	-10.9137***	-10.9620***	-10.9888***	-14.7099***	-14.7135***	-14.1026***
UK	-12.4198***	-12.4271***	-12.2335***	-12.7600***	-12.6100***	-12.3772***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 5 22/10/2002 – 08/03/2005. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.7A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 6: 15/03/2005 – 31/07/2007

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-2.8583	-1.1310	1.5604	-2.8583	-1.0905	1.7798
EGY	-2.0573	-1.6196	0.8592	-2.1282	-1.6178	0.9249
KEN	-2.2267	-1.7284	1.1699	-2.3370	-1.7226	1.1830
MAU	-1.4387	0.5767	2.2701	-1.4311	1.0247	2.6994
MOR	-2.9991	-0.7294	1.5778	-3.0255	-0.6522	1.7749
NIG	-1.2403	0.8553	3.0742	-1.4285	0.8437	3.0572
SAF	-1.7005	-1.5330	0.7527	-1.8255	-1.5433	0.7470
TUN	-2.3850	-2.3361	0.6076	-2.4646	-2.3249	0.6076
UK	-2.8583	-1.1310	1.5604	-2.8583	-1.0905	1.7798
First Difference						
BOT	-11.2138***	-11.2361***	-10.9970***	-11.3322***	-11.3465***	-10.9975***
EGY	-11.6663***	-11.6940***	-11.5738***	-11.6562***	-11.6825***	-11.5608***
KEN	-10.3014***	-10.3036***	-10.1778***	-10.2640***	-10.2690***	-10.1457***
MAU	-10.1539***	-10.0435***	-9.7362***	-13.0053***	-9.9923***	-9.7976***
MOR	-13.0510***	-13.1060***	-12.7462***	-13.0510***	-13.1060***	-12.6795***
NIG	-12.0573***	-11.9301***	-5.8705***	-12.1012***	-12.0214***	-11.6520***
SAF	-11.0966***	-11.1203***	-11.0660***	-11.1050***	-11.1291***	-11.1146***
TUN	-11.4437***	-11.3804***	-11.3645***	-11.4396***	-11.3798***	-11.3645***
UK	-11.2138***	-11.2361***	-10.9970***	-11.3322***	-11.3465***	-10.9975***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 6 15/03/2005 – 31/07/2007. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Table 4.3.8A: Augmented Dickey-Fuller and Phillip-Perron Unit Root Tests for Currency Exchanged Weekly Data Sub-Period 7: 07/08/2007 – 28/12/2010

	Augmented Dickey-Fuller			Phillip-Perron		
Market	**Constant + Trend**	**Constant**	**None**	**Constant + Trend**	**Constant**	**None**
Level						
BOT	-1.1916	-1.5491	-0.3631	-1.1544	-1.5491	-0.3626
EGY	-1.6708	-1.6332	-0.0971	-1.6608	-1.6231	-0.0709
KEN	-1.3488	-1.5634	-0.5191	-1.4801	-1.6681	-0.5204
MAU	-1.0835	-0.8050	1.1794	-1.2444	-0.9597	1.0530
MOR	-2.7380	-2.6121**	0.2372	-2.7600	-2.6121**	0.3242
NIG	-1.3896	-0.9407	-1.2209	-1.3080	-0.8802	-1.2733
SAF	-1.4741	-0.2421	1.0559	-1.2825	0.0810	1.3781
TUN	-1.5233	-1.2708	0.2188	-1.5280	-1.2854	0.2197
UK	-1.1916	-1.5491	-0.3631	-1.1544	-1.5491	-0.3626
First Difference						
BOT	-13.8825***	-13.7492***	-13.7886***	-13.8832***	-13.7492***	-13.7886***
EGY	-13.9007***	-13.9408***	-13.9777***	-13.8931***	-13.9327***	-13.9688***
KEN	-11.8948***	-11.8804***	-11.9110***	-11.8431***	-11.8620***	-11.8935***
MAU	-12.2701***	-12.3000***	-12.2088***	-12.3015***	-12.3305***	-12.2546***
MOR	-11.6075***	-11.5927***	-11.5985***	-13.2570***	-13.2611***	-13.2650***
NIG	-14.0390***	-14.0722***	-14.0271***	-14.0787***	-14.1128***	-14.0419***
SAF	-15.2241***	-15.1179***	-15.0324***	-15.2832***	-15.0919***	-14.9866***
TUN	-13.3527***	-13.2630***	-13.2879***	-13.3535***	-13.2630***	-13.2879***
UK	-13.8825***	-13.7492***	-13.7886***	-13.8832***	-13.7492***	-13.7886***

This table shows the Augmented Dickey-Fuller and Phillip-Perron unit root tests for the weekly currency exchanged prices in sub-period 7 07/08/2007 – 28/12/2010. Columns two to four show the ADF statistic with both a constant β and trend t, just a constant β or neither respectively incorporated within the model. Columns five to seven show the same information but for the P-P test results. A ** indicates significance at the 5% level and *** indicates significance at the 1% level.

Appendix 4.4 Summary of the Local Currency Daily and Weekly Unit Root Tests

Table 4.4A

Period	Whole Period:		Period 1: Pre-Asian Crisis		Period 2: Asian Crisis		Period 3: Pre Dot Com		Period 4: Dot Com		Period 5: Post Dot Com		Period 6:Pre Banking Crisis		Period 7: Banking Crisis	
Test	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**	**ADF**	**PP**
BOT	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
EGY	1 (1)	1 (1)	1 (1)	1 (1)	**0** (1)	**0** (1)	1 (1)	1 (1)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
KEN	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	**0** (**0**)	**0** (**0**)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
MAU	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
MOR	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	**0** (1)	**0** (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
NIG	1 (1)	1 (1)	1 (1)	1 (1)	**0** (**0**)	**0** (**0**)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
SAF	1 (1)	1 (1)	1 (1)	**0** (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
TUN	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
UK	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

Note: The table displays the daily and weekly local currency results for the augmented Dickey-Fuller and Phillip-Perron unit root tests over each of the eight periods examined. A 1 indicates that the unit root test revealed the series to be non-stationary and of order I(1), while a 0 implies that the test revealed the series to be I(0) in nature and therefore removed from the sample. The daily results are shown without brackets while the weekly results are displayed within brackets.

Appendix 4.5 Local Currency Cointegration Results Summary

Table 4.5A

Period of Testing	Whole Period: 02/01/96 – 28/12/10	Pre-Asian Crisis Period 1: 02/01/96 – 30/06/97	Asian Crisis Period 2: 01/07/97 – 31/12/98	Pre-Dot Com/Post Asian Crisis Period 3: 01/01/99 – 10/03/00	Dot Com Crisis Period 4: 13/03/00 – 09/10/02	Post-Dot Com Crisis Period 5: 10/10/02 – 09/03/05	Pre-Banking Crisis Period 6: 10/03/05 – 08/08/07	Banking Crisis Period 7: 09/08/07 – 28/12/10
Number of markets in Group	*Number of combinations available for diversification based on no cointegration between groups*							
2 Markets	5 (5)	4 (3)	2 (3)	5 (5)	2 (2)	4 (4)	2 (3)	3 (7)
3 Markets	7 (9)	8 (9)	5 (7)	18 (10)	9 (11)	12 (13)	7 (10)	9 (20)
4 Markets	7 (7)	9 (10)	3 (8)	26 (7)	13 (21)	11 (16)	10 (19)	8 (27)
5 Markets	2 (3)	2 (4)	0 (4)	23 (2)	12 (18)	6 (10)	4 (11)	5 (27)
6 Markets	0 (0)	0 (0)	0 (1)	14 (0)	6 (16)	2 (1)	1 (4)	2 (13)
7 Markets	0 (0)	0 (0)	0 (0)	5 (0)	1 (6)	0 (0)	0 (1)	0 (1)
8 Markets	0 (0)	0 (0)	0 (0)	0 (0)	0 (1)	0 (0)	0 (0)	0 (0)
9 Markets	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	**21 (24)**	**23 (26)**	**10 (23)**	**91 (24)**	**43 (75)**	**35 (44)**	**24 (48)**	**27 (95)**
Overall Number of Possible Market Combinations	**63 (63)**	**63 (63)**	**63 (63)**	**127 (127)**	**127 (127)**	**255 (255)**	**255 (255)**	**255 (255)**
Percentage of Available Market Combinations with Diversification Potential	**33.33% (38.10%)**	**36.51% (41.27%)**	**15.87% (36.51%)**	**71.65% (18.90%)**	**33.86% (59.06%)**	**13.73% (17.25%)**	**9.41% (18.82%)**	**10.59% (37.25%)**

This table shows the number of no-cointegration groups in the whole period and each of the sub-periods, for local currency daily and weekly cointegration testing. The left hand column shows the number of markets used with the UK always employed as the base market for each group. The table also details the number of total market combinations available within each period at the start of the analysis and then after those series that are found to be stationary have been removed. Finally the table details the percentage of the remaining combinations of markets, which can provide diversification potential within each period. The weekly data results are displayed in parentheses.

Appendix 4.6 Local Currency Market Occurrence in each of the Periods

Table 4.6A

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Sub-period Totals
Total Cointegration-free combinations in each period	21 (24)	23 (26)	10 (23)	91 (24)	43 (75)	35 (44)	24 (48)	27 (95)	**253 (335)**
	Number of Occurrences Within Each Period								
BOT	N/A	N/A	N/A	N/A	N/A	14 (17)	0 (0)	10 (22)	**24 (39)**
EGY	11 (13)	5 (8)	6 (14)	36 (7)	18 (31)	0 (0)	14 (28)	11 (45)	**90 (133)**
KEN	11 (13)	15 (17)	5 (13)	43 (7)	0 (35)	12 (16)	14 (33)	14 (54)	**103 (175)**
MAU	8 (9)	10 (14)	1 (9)	39 (5)	27 (52)	1 (0)	10 (19)	5 (35)	**93 (134)**
MOR	1 (1)	10 (11)	4 (11)	48 (13)	26 (40)	20 (21)	5 (18)	19 (49)	**132 (163)**
NIG	9 (11)	9 (8)	0 (0)	59 (14)	30 (46)	21 (24)	10 (15)	0 (20)	**129 (127)**
SAF	8 (9)	6 (9)	5 (15)	47 (6)	21 (42)	17 (23)	2 (20)	4 (40)	**102 (155)**
TUN	N/A	N/A	N/A	39 (2)	21 (36)	10 (22)	12 (17)	12 (42)	**94 (119)**

This table reports the number of occurrences of each market within the cointegration-free portfolios during each of the periods examined for the local currency results. The sub-period total column shows the total number of occurrences for each of the markets across all of the sub-periods excluding the whole period. The weekly results are displayed in parentheses.

Appendix 4.7: Daily Local Currency Chi-Squared Tests for Market Occurrence in the Cointegration-Free Portfolios

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Total
BOT						14 2.8 44.859	0 1.97 1.973	10 2.21 27.486	**24**
EGY	11 5.95 4.29	5 6.82 0.484	6 2.6 4.436	36 38.54 0.168	18 17.72 0.004	0 11.77 11.773	14 8.3 3.909	11 9.29 0.313	**101**
KEN	11 6.71 2.736	15 7.69 6.94	5 2.94 1.448	43 43.5 0.006	0 20 20.002	12 13.29 0.125	14 9.37 2.286	14 10.49 1.174	**114**
MAU	8 5.95 0.708	10 6.82 1.487	1 2.6 0.987	39 38.54 0.005	27 17.72 4.858	1 11.77 9.858	10 8.3 0.347	5 9.29 1.984	**101**
MOR	1 7.83 5.961	10 8.98 0.117	4 3.43 0.096	48 50.75 0.149	26 23.34 0.304	20 15.5 1.304	5 10.93 3.22	19 12.24 3.735	**133**
NIG	9 8.13 0.094	9 9.31 0.011	0 3.56 3.556	59 52.66 0.763	30 24.21 1.383	21 16.09 1.501	10 11.34 0.159	0 12.7 12.699	**138**
SAF	8 6.48 0.357	6 7.42 0.273	5 2.83 1.655	47 41.98 0.601	21 19.3 0.15	17 12.82 1.361	2 9.04 5.485	4 10.12 3.703	**110**
TUN				39 35.87 0.273	21 16.49 1.231	10 10.96 0.084	12 7.73 2.362	12 8.65 1.297	**94**
Total	**48**	**55**	**21**	**311**	**143**	**95**	**67**	**75**	**815**

Chi-Squared = 239.853, DF = 49, P-Value = 0.000 Note: 14 cells with an expected count of less than 5 and 1 cell with an expected count of less than 1.

Appendix 4.8: Weekly Local Currency Chi-Squared Tests for Market Occurrence in the Cointegration-Free Portfolios

	Whole Period	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Total
BOT						17 4.36 36.688	0 5.31 5.313	22 10.87 11.382	**39**
EGY	13 7.43 4.184	8 8.88 0.088	14 8.22 4.061	7 7.16 0.004	31 37.4 1.094	0 16.31 16.311	28 19.89 3.306	45 40.71 0.452	**146**
KEN	13 9.56 1.236	17 11.44 2.702	13 10.59 0.55	7 9.22 0.535	35 48.15 3.593	16 21 1.192	33 25.61 2.13	54 52.42 0.048	**188**
MAU	9 7.27 0.41	14 8.7 3.225	9 8.05 0.111	5 7.01 0.578	52 36.63 6.453	0 15.98 15.975	19 19.48 0.012	35 39.87 0.596	**143**
MOR	1 8.34 6.461	11 9.98 0.104	11 9.24 0.337	13 8.04 3.054	40 42.01 0.096	21 18.32 0.392	18 22.34 0.844	49 45.73 0.234	**164**
NIG	11 7.02 2.258	8 8.4 0.019	0 7.77 7.771	14 6.77 7.727	46 35.35 3.211	24 15.42 4.779	15 18.8 0.768	20 38.48 8.875	**138**
SAF	9 8.34 0.052	9 9.98 0.096	15 9.24 3.598	6 8.04 0.519	42 42.01 0	23 18.32 1.195	20 22.34 0.246	40 45.73 0.718	**164**
TUN				2 5.84 2.522	36 30.48 1	22 13.29 5.701	17 16.21 0.038	42 33.18 2.344	**119**
Total	**56**	**67**	**62**	**54**	**282**	**123**	**150**	**307**	**1101**

Chi-Squared = 225.636, DF = 49, P-Value = 0.000 Note: 5 cells with an expected count of less than 5

This table shows the results of the Chi-Squared tests on the number of market occurrences in each of the cointegration-free portfolios for the local currency testing. The table details for each market the number of instances where it was present in the no-cointegration portfolios, the expected number of instances assuming an association between the markets and finally the Chi-Squared statistic for each market in each period.

Appendix 4.9 Local Currency Daily and Weekly Granger Causality Over the Whole Period: 02/01/1996 – 28/12/2010

Table 4.9A

		Effect						
		EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
Cause	**EGY**		**0.0020[a]** (**0.0011[a]**)	**0.0031[a]** (**0.0004[a]**)	0.8244 (0.4161)	0.1811 (**0.0001**[a])	**0.0143[b]** (0.7627)	0.7273 (0.1686)
	KEN	**0.0042[a]** (**0.0072[a]**)		**0.0067[a]** (**0.0002[a]**)	**0.0378[b]** (0.0653)	0.8610 (**0.0003[a]**)	0.8349 (0.2619)	0.9320 (0.7011)
	MAU	**0.0001[a]** (0.3655)	**0.0029[a]** (**0.0003[a]**)		0.2903 (0.0762)	**0.0291[b]** (**0.0034[a]**)	0.2756 (0.3309)	0.1510 (0.4931)
	MOR	**0.0034[a]** (0.3418)	**0.0293[b]** (0.8256)	0.2457 (0.9655)		**0.0200[b]** (0.0648)	0.3893 (0.1314)	**0.0070[a]** (0.2366)
	NIG	0.9299 (0.4714)	0.8785 (**0.0207[b]**)	0.1480 (0.9833)	0.5526 (0.7408)		0.2761 (0.3302)	0.6043 (0.7577)
	SAF	**0.0000[a]** (**0.0003[a]**)	**0.0174[b]** (0.2045)	**0.0017[a]** (**0.0261[b]**)	**0.0074[a]** (0.5053)	0.1202 (0.1232)		0.1151 (0.3324)
	UK	**0.0000[a]** (**0.0002[a]**)	**0.0112[b]** (**0.0019[a]**)	**0.0000[a]** (**0.0002[a]**)	**0.0394[b]** (0.3329)	**0.0163[b]** (**0.0010[a]**)	**0.0000[a]** (0.2119)	

Note: This table details the local currency results for the Granger causality testing over the Whole Period: 02/01/1996 – 28/12/2010. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The markets in the left hand column of all the tables refer to the dependant variable or the lead markets. The markets in the top columns in each table refer to the independent variables or the effected markets. The table shows the results from both the daily and weekly testing, with the weekly testing results shown in brackets. An [b] indicates significance at the 5 per cent level and [a] indicates significance at the 1 per cent level. The weekly results are displayed in parentheses.

Appendix 4.10 Local Currency Granger Causality Results over all Sub-Periods

Table 4.10A

Period 1: Pre Asian Crisis							
Cause	**Effect**						
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
EGY		0.2592 (0.2508)	0.5756 (0.6350)	0.9200 (0.2549)	**0.0248**[b] (0.4053)	0.4499 (0.1094)	0.2542 (0.3013)
KEN	0.6519 (0.0643)		0.3565 (0.2714)	0.4841 (0.2379)	0.9275 (0.5239)	0.8642 (0.3719)	0.8919 (0.8002)
MAU	0.5838 (0.9865)	0.4865 (0.3098)		0.2983 (0.8329)	0.7552 (0.7500)	0.7739 (0.2024)	0.5043 (0.8253)
MOR	0.5860 (0.5808)	0.4826 (0.9645)	0.7530 (0.4360)		**0.0001**[a] (0.5544)	0.2510 (0.1165)	0.9878 (0.8723)
NIG	0.7947 (0.8803)	0.6795 (0.2616)	0.7696 (0.8688)	0.2372 (0.0158)		0.8420 (0.6089)	0.4046 (0.0996)
SAF	0.3844 (0.0900)	0.8407 (0.2042)	0.9753 (0.9942)	0.9107 (0.3000)	0.2433 (0.0740)		0.0855 (0.9705)
UK	0.9482 (0.0876)	0.2754 (0.6548)	0.5666 (0.6783)	0.4735 (0.8857)	0.3352 (0.2984)	0.8232 (0.9584)	
Period 2: Asian Crisis							
Cause	**Effect**						
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**UK**
EGY		0.8069 (0.2351)	0.7069 (0.3117)	0.6157 (0.4132)	0.8899 (0.9418)	0.1702 (0.7638)	0.1830 (0.2271)
KEN	0.8868 (0.0927)		0.6876 (0.4973)	0.5833 (0.7629)	0.5790 (0.4326)	0.1217 (0.6822)	0.4274 (0.9448)
MAU	0.9370 (0.8854)	0.8004 (0.5371)		0.3753 (0.5067)	0.2603 (0.1222)	0.5921 (0.2130)	0.6987 (0.5925)
MOR	0.9848 (0.8901)	0.7842 (0.7132)	0.4728 (0.5918)		0.7255 (0.5749)	0.4382 (0.4675)	0.2775 (0.5845)
NIG	0.7430 (0.9397)	0.4438 (0.8781)	0.7188 (0.9418)	0.3844 (0.5759)		0.6219 (0.4129)	0.1065 (0.4703)
SAF	0.7479 (0.3560)	0.3272 (0.3315)	**0.0028**[a] (0.7472)	0.6792 (0.9295)	0.1293 (0.9484)		0.1338 (0.8987)
UK	0.7006 (0.3662)	0.0827 (0.6230)	**0.0009**[a] (0.1895)	0.9448 (0.4941)	0.8111 (0.1940)	0.1068 (0.3995)	

This table reports the local currency results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependant or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Appendix 4.10 – Continued

Table 4.10A

Period 3: Post Asian Crisis/ Pre-Dot Com Crisis								
Cause	**Effect**							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
EGY		0.6125 (0.5631)	0.8668 (0.1524)	0.6449 (0.4100)	0.7410 (0.1917)	0.9191 (0.2707)	0.4413 (0.1130)	0.2114 (**0.0468**[b])
KEN	0.8283 (0.3679)		0.8008 (0.5833)	0.7779 (0.3648)	0.8254 (0.7296)	0.2870 (0.1057)	0.7620 (0.9129)	0.2251 (0.0957)
MAU	0.5899 (0.4385)	0.1160 (0.7859)		0.1680 (0.9626)	**0.0436**[b] (0.1159)	0.8148 (0.4216)	0.9605 (0.6941)	0.2485 (0.8535)
MOR	0.1879 (0.5359)	0.1476 (0.1876)	0.3396 (0.7994)		0.6780 (0.7259)	0.1074 (0.1622)	0.4691 (0.2371)	0.2083 (0.7294)
NIG	0.3163 (0.3895)	0.4707 (0.7953)	0.0991 (0.1136)	0.3328 (0.6244)		0.4963 (0.0868)	0.7825 (0.2830)	0.7333 (0.8248)
SAF	0.5834 (0.2259)	0.1755 (0.2397)	0.1654 (0.6455)	0.9013 (0.3715)	0.1449 (0.8226)		0.3705 (0.7682)	0.0821 (0.5071)
TUN	0.3158 (0.2105)	0.1297 (0.6622)	0.8693 (0.3368)	0.8671 (0.9815)	0.7407 (0.7111)	0.5148 (0.2598)		0.4706 (0.0599)
UK	0.6596 (0.7577)	0.8321 (0.2786)	0.4095 (0.4454)	0.9825 (0.5843)	0.1739 (0.7555)	0.4171 (0.5116)	0.3576 (0.6806)	
Period 4: Dot Com Crisis								
Cause	**Effect**							
	EGY	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
EGY		0.8796 (0.4429)	0.7086 (0.8023)	0.3460 (0.9704)	0.9030 (0.9655)	0.2018 (0.8205)	0.1564 (0.4886)	0.5025 (0.5428)
KEN	0.1731 (0.5549)		0.2997 (0.9690)	0.9128 (0.7001)	0.9456 (0.5970)	0.3793 (0.7326)	0.8408 (0.2255)	0.9995 (0.2680)
MAU	0.8536 (0.9692)	0.2893 (0.4060)		0.8570 (0.7168)	0.9239 (0.2063)	0.1464 (0.9555)	0.4582 (0.1924)	0.5338 (0.8234)
MOR	0.4474 (0.4096)	0.6806 (0.5925)	0.6634 (0.8467)		**0.0424**[b] (0.8491)	0.3661 (0.1618)	0.7502 (0.3376)	**0.0478**[b] (0.9484)
NIG	0.2834 (0.6015)	0.4358 (0.2151)	0.7917 (0.5648)	0.3380 (**0.0202**[b])		0.9826 (0.5308)	0.7266 (0.2519)	0.8564 (0.5739)
SAF	**0.0054**[a] (0.0025)	0.3174 (0.7403)	0.6807 (0.7206)	0.2118 (0.8082)	0.7162 (0.8061)		0.1823 (**0.0037**[a])	0.0749 (0.9043)
TUN	0.2866 (0.6804)	0.9699 (0.1185)	0.8805 (0.6284)	0.7725 (0.4096)	0.3829 (0.7316)	0.9780 (0.7842)		0.6204 (0.8262)
UK	**0.0067**[a] (**0.0362**[b])	0.2056 (0.9414)	0.4986 (0.2811)	0.1819 (**0.0330**[b])	0.5975 (0.1613)	**0.0000**[a] (0.5896)	0.1766 (0.0986)	

This table reports the local currency results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependant or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Appendix 4.10 – Continued

Table 4.10A

Period 5: Post Dot Com Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		0.6064 (0.3570)	0.7040 (0.6477)	0.6701 (0.6840)	0.9796 (0.7500)	0.1855 (0.0862)	0.6848 (0.1354)	0.9785 (0.0976)	**0.0201**[b] (0.8551)
EGY	**0.0105**[b] (0.1601)		0.4402 (0.3593)	0.3462 (0.4845)	0.6306 (0.5211)	0.5260 (0.3476)	0.7550 (0.0965)	0.5220 (**0.0175**[b])	0.6480 (0.7424)
KEN	0.3832 (0.9058)	0.4650 (0.9952)		0.8799 (0.1859)	0.5559 (0.7162)	0.9871 (0.7420)	0.7234 (0.7100)	0.9094 (0.2373)	0.4569 (0.6924)
MAU	0.1898 (0.6559)	**0.0121**[b] (0.6716)	0.3005 (0.5916)		0.9874 (0.8642)	0.4411 (**0.0316**[b])	0.1660 (**0.0037**[a])	0.7304 (0.4512)	0.7136 (**0.0370**[b])
MOR	0.7194 (0.5735)	**0.0326**[b] (0.7981)	0.3488 (0.2545)	0.4694 (0.1797)		0.7371 (0.5780)	0.9646 (0.6807)	0.1019 (0.6834)	0.9135 (0.8375)
NIG	0.8368 (0.9062)	0.4947 (0.8374)	0.2982 (0.5031)	0.5174 (0.4831)	0.7084 (0.3457)		0.9399 (0.3261)	0.9004 (0.4218)	0.9152 (0.3404)
SAF	**0.0035**[a] (0.3947)	0.1947 (0.3267)	0.0862 (0.4418)	0.1052 (0.4981)	0.4671 (0.4728)	0.9426 (0.6057)		0.6986 (0.1878)	**0.0291**[b] (0.9873)
TUN	0.7020 (0.9893)	0.3790 (0.4758)	0.6772 (0.4108)	0.5064 (0.8452)	0.8173 (0.9465)	0.9889 (0.7736)	0.4496 (0.4289)		0.5552 (0.4586)
UK	0.1361 (0.8920)	0.1777 (0.3215)	**0.0444**[b] (0.2504)	0.1095 (0.1153)	0.5484 (0.3286)	0.0923 (0.6254)	0.8634 (0.5679)	0.7171 (**0.0468**[b])	
Period 6: Pre-Banking Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		0.0706 (0.0573)	0.8014 (0.5287)	0.8219 (0.7835)	**0.0078**[a] (0.2094)	0.6595 (0.9055)	0.8499 (0.8480)	0.3533 (0.9799)	0.1568 (0.8784)
EGY	0.9903 (0.3523)		0.8930 (0.7539)	0.8973 (0.7127)	0.2774 (0.1463)	0.5919 (0.6800)	0.2545 (0.5051)	0.7214 (0.6393)	0.3345 (0.1814)
KEN	0.1537 (0.6150)	0.0673 (0.7571)		0.0664 (0.8496)	0.4341 (0.2654)	0.8285 (0.6517)	0.1787 (0.6487)	0.4016 (0.9087)	0.8966 (0.0881)
MAU	0.8116 (0.9103)	0.7837 (0.6698)	0.3475 (0.4394)		0.6705 (0.6529)	0.4752 (0.5496)	0.6391 (0.9726)	0.1987 (0.2523)	0.9122 (0.2561)
MOR	0.7156 (0.5745)	0.7397 (0.6256)	0.1912 (0.6963)	0.3595 (0.4727)		0.9452 (0.3505)	0.8925 (0.0906)	0.8231 (0.7467)	0.6140 (0.6158)
NIG	0.1317 (0.6959)	0.7665 (0.6521)	0.4972 (0.7997)	0.7729 (0.4736)	0.4427 (0.2919)		0.2627 (0.7779)	0.1479 (0.7830)	0.3181 (0.9587)
SAF	0.1100 (0.8508)	**0.0003**[a] (**0.0054**[a])	0.2154 (0.9929)	0.8751 (0.8158)	0.0730 (**0.0160**[b])	0.9630 (0.8364)		0.9099 (0.8827)	0.2191 (0.9623)
TUN	0.5665 (0.8927)	0.6301 (0.8138)	**0.0308**[b] (0.5331)	**0.0471**[b] (**0.0489**[b])	0.0888 (0.9792)	0.4803 (0.5395)	0.7237 (0.7804)		0.4594 (0.5763)
UK	**0.0168**[b] (0.5552)	**0.0002**[a] (**0.0026**[a])	0.6051 (0.1455)	0.7273 (0.2060)	0.1113 (0.1962)	0.8771 (0.2814)	**0.0281**[b] (0.2810)	0.1885 (0.8187)	

This table reports the local currency results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependant or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Appendix 4.10 – Continued

Table 4.10A

Period 7: Banking Crisis									
Cause	**Effect**								
	BOT	**EGY**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**
BOT		**0.0003**[a] (0.1009)	**0.0174**[b] (**0.0178**[b])	0.3189 (0.0644)	0.6070 (0.8434)	0.0600 (**0.0154**[b])	0.2884 (0.0625)	0.9096 (0.8531)	0.7005 (0.2772)
EGY	0.6656 (**0.0067**[a])		**0.0001**[a] (**0.0063**[a])	**0.0038**[a] (**0.0011**[a])	0.7959 (0.8621)	0.1574 (**0.0007**[a])	0.0820 (0.1842)	**0.0000**[a] (0.5242)	0.7134 (0.2583)
KEN	0.8419 (0.2363)	**0.0072**[a] (0.0897)		**0.0147**[b] (**0.0155**[b])	0.1026 (**0.0452**[b])	0.9380 (**0.0017**[a])	0.9554 (0.3756)	0.5070 (0.1664)	0.4391 (0.1671)
MAU	0.0678 (0.6379)	**0.0010**[a] (0.3902)	0.0966 (**0.0011**[a])		0.1323 (0.0888)	0.0637 (**0.0185**[b])	0.1361 (0.5126)	**0.0206**[b] (0.1533)	0.2545 (0.8964)
MOR	0.0518 (0.1601)	0.1259 (0.8015)	**0.0010**[a] (0.8990)	0.2184 (0.0923)		0.1571 (0.4307)	0.4483 (0.9571)	0.1466 (0.7388)	**0.0368**[b] (0.0804)
NIG	0.4312 (0.2291)	0.7735 (0.6445)	0.7012 (0.1210)	0.3702 (0.9822)	0.9035 (0.9578)		0.1972 (0.6325)	0.8096 (0.9514)	0.4542 (0.7267)
SAF	**0.0037**[a] (**0.0125**[b])	**0.0000**[a] (0.0870)	**0.0000**[a] (0.0196)	**0.0094**[a] (**0.0018**[a])	0.1488 (0.2106)	0.1085 (0.1460)		0.9389 (0.9290)	0.0508 (0.1681)
TUN	0.3701 (0.6178)	0.1617 (0.3711)	0.1563 (0.0561)	0.3940 (0.7142)	0.8558 (0.7874)	0.6935 (0.1470)	0.6266 (0.2932)		0.9993 (0.2736)
UK	**0.0001**[a] (0.8505)	**0.0000**[a] (**0.0006**[a])	**0.0000**[a] (**0.0027**[a])	**0.0000**[a] (**0.0004**[a])	0.3180 (0.2342)	**0.0308**[b] (**0.0051**[a])	**0.0135**[b] (**0.0028**[a])	0.7543 (**0.0407**[b])	

This table reports the local currency results for the Granger causality testing over each of the sub-periods examined. The table details how each of the markets' short-term causal relationships have been affected by the various crisis periods that have occurred within the testing period. Specifically the table details how shocks or changes from within one market are transmitted into other markets. The left hand column of the table lists the dependant or 'cause' markets. The markets in each column are the independent or 'effect' markets. The results from both the daily and weekly testing are shown, with the weekly testing results in parentheses. An [b] indicates significance at the 5 per cent level, while an [a] indicates significance at the 1 per cent level.

Appendix 5.1 Weekly Currency Exchanged Descriptive Statistics

Table 5.1.1A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1996

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0056	0.0237	-0.0334	0.1078	0.1412	1.7372***	8.3865***	89.02***
GHA	-0.0063	0.0340	-0.1211	0.1489	0.2700	0.4831	13.5272***	242.14***
IVC	-0.0003	0.0279	-0.1037	0.0820	0.1857	-0.2232	7.7828***	49.99***
KEN	-0.0036	0.0147	-0.0415	0.0282	0.0696	0.0687	2.9744***	0.04
MAU	-0.0031	0.0200	-0.0527	0.0556	0.1082	0.3054	3.7126***	1.91
MOR	0.0038	0.0139	-0.0210	0.0510	0.0720	1.2764***	5.8816***	32.11***
NIG	0.0072	0.0143	-0.0296	0.0439	0.0735	-0.3024	3.7676***	2.07
SAF	-0.0062	0.0306	-0.0741	0.0760	0.1500	-0.1781	3.2132***	0.37
Av AESMs	-0.0004	0.0224	-0.0596	0.0742	0.1338			
UK	0.0021	0.0145	-0.0371	0.0322	0.0693	-0.5124	3.2241***	2.38
World Index	0.0002	0.0155	-0.0345	0.0394	0.0739	-0.2824	2.8787***	0.72

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1996. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.2A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1997

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0049	0.0459	-0.1179	0.1201	0.2380	0.3185	3.5532***	1.54
GHA	-0.0063	0.0226	-0.1065	0.0589	0.1654	-1.1778***	9.6688***	108.38***
IVC	-0.0023	0.0349	-0.1696	0.0866	0.2563	-1.7044***	12.5088***	221.08***
KEN	-0.0020	0.0367	-0.1085	0.1146	0.2231	0.1997	4.6931***	6.56**
MAU	0.0004	0.0176	-0.0402	0.0415	0.0817	-0.0985	2.7925***	0.18
MOR	0.0061	0.0246	-0.0651	0.0808	0.1458	0.4936	4.4758***	6.83**
NIG	-0.0002	0.0226	-0.0487	0.0553	0.1041	0.5103	3.0595***	2.26
SAF	-0.0015	0.0460	-0.2638	0.1125	0.3762	-3.3202***	22.0914***	885.25***
Av AESMs	-0.0001	0.0314	-0.1150	0.0838	0.1988			
UK	0.0042	0.0229	-0.0943	0.0422	0.1365	-1.4959***	7.9294***	72.04***
World Index	0.0032	0.0241	-0.0961	0.0413	0.1374	-1.4662***	6.9857***	53.05***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1997. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.3A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1998

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0080	0.0253	-0.0588	0.0639	0.1227	0.3378	3.7835***	2.27
GHA	0.0018	0.0318	-0.0871	0.1058	0.1929	0.8445**	6.3378***	29.74***
IVC	0.0011	0.0383	-0.1772	0.1506	0.3278	-0.5942*	15.0341***	310.74***
KEN	-0.0017	0.0244	-0.0520	0.0924	0.1444	1.3797***	6.9894***	50.00***
MAU	0.0006	0.0248	-0.0818	0.0735	0.1553	-0.4599	5.6782***	17.04***
MOR	0.0036	0.0196	-0.0359	0.0703	0.1062	0.7532**	4.6159***	10.37***
NIG	-0.0067	0.0211	-0.0794	0.0444	0.1238	-0.5983*	4.695***	9.15**
SAF	-0.0071	0.0630	-0.1581	0.1300	0.2880	-0.5115	3.1773***	2.29
TUN	-0.0011	0.0119	-0.0266	0.0326	0.0592	0.4213	3.6497***	2.41
Av AESMs	-0.0019	0.0289	-0.0841	0.0848	0.1689			
UK	0.0024	0.0312	-0.0897	0.0524	0.1421	-0.6178*	3.1755***	3.31
World Index	0.0036	0.0309	-0.0999	0.0631	0.1630	-0.6936**	4.0315***	6.35**

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1998. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.4A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1999

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0120	0.0415	-0.0728	0.1009	0.1737	0.2405	2.6803***	0.72
GHA	-0.0060	0.0208	-0.0483	0.0676	0.1158	1.1879***	6.6313***	40.80***
IVC	-0.0027	0.0181	-0.0840	0.0384	0.1225	-1.3599***	10.0014***	122.24***
KEN	-0.0071	0.0213	-0.0556	0.0565	0.1121	0.3108	3.6085***	1.64
MAU	-0.0006	0.0185	-0.0505	0.0378	0.0883	-0.3171	3.1252***	0.91
MOR	-0.0023	0.0175	-0.0614	0.0423	0.1037	-0.4275	4.9742***	10.03***
NIG	-0.0015	0.0398	-0.1143	0.1254	0.2397	0.0668	4.7053***	6.34**
SAF	0.0090	0.0347	-0.0660	0.0781	0.1441	0.0965	2.2398***	1.33
TUN	0.0030	0.0194	-0.0211	0.0847	0.1058	2.0034***	8.8625***	109.25***
Av AESMs	0.0004	0.0257	-0.0638	0.0702	0.1340			
UK	0.0026	0.0238	-0.0445	0.0553	0.0999	-0.0592	2.3381***	0.98
World Index	0.0046	0.0237	-0.0399	0.0467	0.0866	-0.2467	1.8703***	3.29

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1999. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.5A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2000

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0097	0.0530	-0.1468	0.0883	0.2350	-0.1978	2.6291***	0.64
GHA	-0.0120	0.0263	-0.0844	0.0696	0.1540	-0.0374	4.7318***	6.51**
IVC	0.0022	0.0329	-0.0660	0.1764	0.2424	2.8364***	16.8565***	485.73***
KEN	-0.0047	0.0172	-0.0469	0.0444	0.0913	0.0613	3.6994***	1.09
MAU	-0.0023	0.0149	-0.0332	0.0360	0.0692	0.0881	2.7911***	0.16
MOR	-0.0035	0.0245	-0.0467	0.0784	0.1251	1.2119***	5.9281***	31.31***
NIG	0.0105	0.0427	-0.0839	0.1253	0.2092	0.4349	3.5121***	2.21
SAF	-0.0025	0.0368	-0.1119	0.0697	0.1816	-0.4305	3.1789***	1.68
TUN	0.0035	0.0215	-0.0410	0.0790	0.1200	0.5431	4.5565***	7.81**
Av AESMs	-0.0021	0.0300	-0.0734	0.0852	0.1586			
UK	-0.0021	0.0233	-0.0490	0.0438	0.0929	-0.0238	2.2832***	1.12
World Index	-0.0013	0.0231	-0.0476	0.0530	0.1006	-0.0504	2.6748***	0.25

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2000. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.6A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2001

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0113	0.0395	-0.0998	0.0817	0.1815	0.1687	2.775***	0.36
GHA	0.0013	0.0188	-0.0424	0.0621	0.1045	0.2875	3.7848***	2.05
IVC	-0.0025	0.0222	-0.0847	0.0909	0.1755	0.2125	10.9358***	136.84***
KEN	-0.0058	0.0210	-0.0555	0.0530	0.1086	0.2442	3.7347***	1.69
MAU	-0.0038	0.0132	-0.0293	0.0274	0.0567	-0.0499	2.5083***	0.55
MOR	-0.0033	0.0273	-0.0505	0.0790	0.1296	0.7859**	3.8416***	6.89**
NIG	0.0057	0.0444	-0.1434	0.1778	0.3212	0.4974	7.7518***	51.07***
SAF	-0.0040	0.0354	-0.0933	0.0601	0.1533	-0.2193	3.0702***	0.43
TUN	-0.0030	0.0149	-0.0342	0.0419	0.0761	0.2930	3.5525***	1.41
Av AESMs	-0.0030	0.0263	-0.0703	0.0749	0.1452			
UK	-0.0031	0.0288	-0.1253	0.0604	0.1857	-1.2944***	7.8221***	64.9***
World Index	-0.0033	0.0271	-0.0759	0.0415	0.1174	-0.2920	2.5973***	1.09

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2001. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.7A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2002

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0018	0.0148	-0.0422	0.0336	0.0757	-0.2680	3.0517***	0.64
EGY	-0.0028	0.0304	-0.0811	0.0537	0.1348	-0.2903	2.5900***	1.12
GHA	0.0025	0.0324	-0.0294	0.2065	0.2359	4.8540***	30.9863***	1937.76***
IVC	0.0038	0.0324	-0.0579	0.1423	0.2002	2.2485***	10.8923***	182.21***
KEN	-0.0016	0.0237	-0.0475	0.0687	0.1162	0.9573***	4.5397***	13.33***
MAU	0.0017	0.0154	-0.0277	0.0351	0.0628	0.3184	2.2727***	2.06
MOR	-0.0043	0.0225	-0.0748	0.0516	0.1264	-0.5881*	4.3923***	7.34**
NIG	-0.0022	0.0336	-0.0656	0.1013	0.1669	0.6009*	3.9819***	5.32*
SAF	0.0021	0.0367	-0.0880	0.0819	0.1700	-0.3593	2.8752***	1.17
TUN	-0.0025	0.0128	-0.0352	0.0358	0.0710	0.5107	4.1034***	4.99*
Av AESMs	-0.0005	0.0255	-0.0549	0.0811	0.1360			
UK	-0.0052	0.0368	-0.1218	0.1018	0.2236	-0.4120	5.7232***	17.88***
World Index	-0.0063	0.0375	-0.0903	0.0944	0.1847	0.0624	3.7578***	1.30

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2002. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.8A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2003

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0019	0.0126	-0.0297	0.0282	0.0579	-0.0519	2.7321***	0.18
EGY	0.0094	0.0434	-0.0999	0.1168	0.2167	-0.2575	2.9926***	0.57
GHA	0.0070	0.0265	-0.0472	0.0738	0.1211	0.5552	3.0529***	2.68
IVC	-0.0005	0.0181	-0.0628	0.0415	0.1043	-0.8451**	5.6004***	20.84***
KEN	0.0119	0.0503	-0.1846	0.2240	0.4086	0.4514	11.511***	158.71***
MAU	0.0063	0.0201	-0.0299	0.0553	0.0852	-0.0278	2.4336***	0.70
MOR	0.0048	0.0203	-0.0421	0.0527	0.0948	0.0352	2.695***	0.21
NIG	0.0066	0.0463	-0.1341	0.1624	0.2965	0.3619	5.479***	14.45***
SAF	0.0047	0.0271	-0.0809	0.0676	0.1485	-0.4759	3.7452***	3.17
TUN	0.0019	0.0156	-0.0368	0.0483	0.0851	0.1000	3.9806***	2.17
Av AESMs	0.0050	0.0280	-0.0748	0.0871	0.1619			
UK	0.0024	0.0251	-0.0683	0.0819	0.1502	-0.0965	4.9024***	7.92**
World Index	0.0032	0.0259	-0.0565	0.0897	0.1462	0.3480	4.4906***	5.86*

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2003. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.9A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2004

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0012	0.0129	-0.0238	0.0284	0.0523	0.0132	2.1689***	1.50
EGY	0.0128	0.0350	-0.0901	0.0971	0.1873	-0.2400	3.7856***	1.84
GHA	0.0046	0.0353	-0.0824	0.1305	0.2129	1.6878***	8.6652***	94.23***
IVC	0.0067	0.0448	-0.1231	0.1571	0.2802	1.1466***	8.6293***	80.05***
KEN	-0.0004	0.0257	-0.0721	0.0591	0.1313	-0.2154	3.2483***	0.54
MAU	0.0017	0.0156	-0.0342	0.0347	0.0689	-0.0199	2.5639***	0.42
MOR	0.0016	0.0232	-0.0576	0.0681	0.1257	-0.1478	3.7411***	1.38
NIG	0.0019	0.0329	-0.0611	0.0782	0.1393	0.2496	2.7595***	0.67
SAF	0.0048	0.0242	-0.0470	0.0539	0.1009	-0.2027	2.4189***	1.09
TUN	-0.0001	0.0111	-0.0293	0.0249	0.0542	-0.2139	2.9802***	0.40
Av AESMs	0.0035	0.0261	-0.0621	0.0732	0.1353			
UK	0.0014	0.0137	-0.0319	0.0301	0.0620	-0.2218	2.6690***	0.66
World Index	0.0008	0.0171	-0.0324	0.0423	0.0747	0.3528	2.6039***	1.42

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2004. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.10A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2005

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0061	0.0134	-0.0291	0.0375	0.0666	-0.034	3.2481***	0.14
EGY	0.0202	0.0478	-0.1077	0.1538	0.2614	0.3626***	3.4852***	1.65
GHA	-0.0058	0.0309	-0.1454	0.0260	0.1714	-2.8596***	12.3759***	261.34***
IVC	0.0050	0.0298	-0.0660	0.1534	0.2194	2.6514	14.7424***	359.68***
KEN	0.0090	0.0220	-0.0368	0.0708	0.1076	0.4018	3.8656***	3.02
MAU	0.0030	0.0166	-0.0281	0.0400	0.0681	0.1527	2.3675***	1.07
MOR	0.0038	0.0147	-0.0383	0.0295	0.0678	-0.5597	3.067***	2.72
NIG	0.0063	0.0311	-0.0666	0.0940	0.1606	0.2610	3.617***	1.42
SAF	0.0065	0.0269	-0.0568	0.0671	0.1239	-0.2577	2.6602***	0.83
TUN	0.0034	0.0126	-0.0264	0.0360	0.0624	0.2540	3.2814***	0.73
Av AESMs	0.0058	0.0246	-0.0601	0.0708	0.1309			
UK	0.0030	0.0110	-0.0219	0.0308	0.0528	-0.0803	2.9844***	0.06
World Index	0.0036	0.0133	-0.0402	0.0356	0.0758	-0.2673	4.377***	4.73*

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2005. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.11A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2006

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0083	0.0186	-0.0250	0.0755	0.1005	1.2586***	6.0921***	34.44***
EGY	0.0003	0.0564	-0.1764	0.0893	0.2657	-0.9212***	3.7174***	8.47**
GHA	-0.0008	0.0111	-0.0262	0.0226	0.0488	0.0641	2.9189***	0.05
IVC	0.0053	0.0272	-0.0400	0.1429	0.1830	3.4089***	16.5207***	496.8***
KEN	0.0048	0.0237	-0.0683	0.0631	0.1313	-0.0226	4.006***	2.20
MAU	0.0041	0.0257	-0.0654	0.0861	0.1515	0.7701**	4.8017***	12.17***
MOR	0.0068	0.0425	-0.1405	0.0858	0.2263	-0.7353**	4.5024***	9.58***
NIG	0.0039	0.0299	-0.0754	0.0903	0.1657	0.3175	3.6472***	1.78
SAF	0.0003	0.0392	-0.1284	0.0936	0.2220	-0.6761*	4.3035***	7.64**
TUN	0.0055	0.0144	-0.0336	0.0398	0.0735	0.2083	3.2271***	0.49
Av AESMs	0.0039	0.0289	-0.0779	0.0789	0.1568			
UK	0.0019	0.0157	-0.0434	0.0401	0.0835	-0.5220	3.7905***	3.72
World Index	0.0006	0.0157	-0.0439	0.0307	0.0746	-0.862**	3.8792***	8.11**

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2006. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.12A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2007

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0058	0.0192	-0.0371	0.0807	0.1178	1.0718***	6.1909***	32.02***
EGY	0.0085	0.0275	-0.0763	0.0593	0.1357	-0.3406	3.1906***	1.08
GHA	0.0032	0.0156	-0.0186	0.0804	0.0990	2.3903***	12.551***	247.17***
IVC	0.0139	0.0358	-0.0160	0.1476	0.1636	2.5744***	8.7515***	129.11***
KEN	0.0013	0.0368	-0.0712	0.1145	0.1857	0.6668*	3.8749***	5.51*
MAU	0.0102	0.0273	-0.0489	0.1109	0.1598	1.0216***	5.5132***	22.73***
MOR	0.0065	0.0290	-0.1238	0.0588	0.1827	-1.3962***	9.1168***	97.96***
NIG	0.0129	0.0342	-0.0485	0.1114	0.1599	0.4494	3.2045***	1.84
SAF	0.0026	0.0365	-0.0923	0.0657	0.1579	-0.6276*	2.9403***	3.42
TUN	0.0029	0.0162	-0.0472	0.0361	0.0833	-0.3018	3.7361***	1.96
Av AESMs	0.0068	0.0278	-0.0580	0.0865	0.1445			
UK	0.0009	0.0178	-0.0402	0.0440	0.0842	0.0210	2.6262***	0.31
World Index	0.0013	0.0167	-0.0292	0.0433	0.0725	0.0716	2.6783***	0.27

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2007. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.13A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2008

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0025	0.0248	-0.0824	0.0652	0.1476	-0.6676*	5.1515***	14.16***
EGY	-0.0089	0.0610	-0.2026	0.0734	0.2760	-1.303***	4.6305***	20.87***
GHA	0.0044	0.0270	-0.0766	0.0798	0.1563	-0.0131	4.3625***	4.1
IVC	0.0032	0.0308	-0.0702	0.1091	0.1793	0.6116*	5.5463***	17.62***
KEN	-0.0064	0.0561	-0.1548	0.1705	0.3253	0.3006	4.3506***	4.83*
MAU	-0.0041	0.0365	-0.1276	0.0760	0.2036	-0.3368	4.0615***	3.49
MOR	0.0042	0.0302	-0.0809	0.0795	0.1604	-0.1493	3.6577***	1.15
NIG	-0.0093	0.0676	-0.2179	0.1732	0.3910	-0.6501*	5.5231***	17.79***
SAF	-0.0040	0.0662	-0.2148	0.2167	0.4315	-0.2107	6.2841***	24.21***
TUN	0.0070	0.0231	-0.0531	0.0761	0.1293	-0.0163	4.1005***	2.68
Av AESMs	-0.0011	0.0423	-0.1281	0.1120	0.2400			
UK	-0.0073	0.0407	-0.0885	0.1669	0.2554	1.1994***	7.7437***	62.4***
World Index	-0.0045	0.0336	-0.1160	0.0913	0.2073	-0.2725	4.8371***	8.11**

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2008. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.14A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2009

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0014	0.0224	-0.0506	0.0356	0.0863	-0.2666	2.1605***	2.14
EGY	0.0042	0.0497	-0.1140	0.1123	0.2263	-0.2315	3.0684***	0.47
GHA	-0.0129	0.0355	-0.1006	0.0552	0.1558	-0.1812	2.5807***	0.67
IVC	-0.0042	0.0227	-0.0907	0.0469	0.1376	-0.8081**	5.5898***	20.19***
KEN	-0.0027	0.0402	-0.0893	0.1256	0.2149	0.6444*	4.9553***	11.88***
MAU	0.0059	0.0368	-0.0887	0.0875	0.1762	-0.2720	3.2509***	0.78
MOR	-0.0041	0.0407	-0.1999	0.0859	0.2858	-1.9848***	12.1132***	214.08***
NIG	-0.0107	0.0681	-0.1994	0.1620	0.3614	-0.3204	3.9213***	2.73
SAF	0.0064	0.0456	-0.1198	0.0877	0.2076	-0.2064	2.9753***	0.37
TUN	0.0053	0.0197	-0.0339	0.0445	0.0784	-0.0999	2.2198***	1.41
Av AESMs	-0.0014	0.0381	-0.1087	0.0843	0.1930			
UK	0.0041	0.0303	-0.0831	0.0571	0.1402	-0.6733*	3.7999***	5.32*
World Index	0.0029	0.0258	-0.0582	0.0582	0.1164	-0.3117	3.0374***	0.85

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2009. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.15A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0017	0.0207	-0.0776	0.0402	0.1178	-0.6323*	5.044***	12.52***
EGY	0.0019	0.0342	-0.1264	0.0658	0.1922	-1.1295***	5.4271***	23.82***
GHA	0.0132	0.0391	-0.1435	0.1005	0.2441	-0.8743**	6.7164***	36.55***
IVC	0.0036	0.0211	-0.0793	0.0462	0.1256	-1.0639***	6.3717***	34.44***
KEN	0.0052	0.0214	-0.0424	0.0615	0.1038	0.7649**	3.4996***	5.61*
MAU	0.0032	0.0175	-0.0441	0.0377	0.0818	-0.2448	2.9696***	0.52
MOR	0.0026	0.0263	-0.0742	0.0719	0.1460	-0.0166	3.9133***	1.81
NIG	0.0043	0.0322	-0.0592	0.1052	0.1644	0.3787	3.5202***	1.83
SAF	0.0057	0.0332	-0.0990	0.0792	0.1783	-0.4632	3.7673***	3.14
TUN	0.0022	0.0155	-0.0354	0.0324	0.0678	-0.2618	2.5613***	1.01
Av AESMs	0.0040	0.0261	-0.0781	0.0641	0.1422			
UK	0.0019	0.0268	-0.0716	0.0598	0.1314	-0.4948	3.5384***	2.75
World Index	0.0023	0.0220	-0.0708	0.0564	0.1272	-0.4879	5.1625***	12.20***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.16A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1996 - 1998

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0009	0.0335	-0.1179	0.1201	0.2380	0.6491***	5.4686***	50.57***
GHA	-0.0039	0.0300	-0.1211	0.1489	0.2700	0.4337**	11.1819***	440.02***
IVC	-0.0007	0.0337	-0.1772	0.1506	0.3278	-0.9182***	13.8846***	792.01***
KEN	-0.0023	0.0267	-0.1085	0.1146	0.2231	0.5397***	7.1434***	119.16***
MAU	-0.0007	0.0208	-0.0818	0.0735	0.1553	-0.1649	5.0285***	27.45***
MOR	0.0045	0.0197	-0.0651	0.0808	0.1458	0.7663***	5.513***	56.31***
NIG	0.0001	0.0203	-0.0794	0.0553	0.1348	-0.2209	4.1848***	10.39***
SAF	-0.0050	0.0478	-0.2638	0.1300	0.3937	-1.3718***	9.1341***	293.5***
Av AESMs	-0.0009	0.0291	-0.1269	0.1092	0.2361			
UK	0.0031	0.0237	-0.0943	0.0524	0.1467	-0.9467***	5.44***	62.00***
World Index	0.0024	0.0241	-0.0999	0.0631	0.1630	-0.8923***	5.7549***	70.04***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 1996 - 1998. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.17A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1999 - 2001

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0030	0.0460	-0.1468	0.1009	0.2477	-0.0591	2.9543***	0.10
GHA	-0.0056	0.0227	-0.0844	0.0696	0.1540	0.1492	5.2499***	33.48***
IVC	-0.0010	0.0251	-0.0847	0.1764	0.2611	2.0998***	20.3004***	2060.12***
KEN	-0.0059	0.0198	-0.0556	0.0565	0.1121	0.2105	3.7595***	4.90*
MAU	-0.0022	0.0157	-0.0505	0.0378	0.0883	-0.0866	3.1215***	0.29
MOR	-0.0030	0.0233	-0.0614	0.0790	0.1404	0.7931***	5.1426***	46.19***
NIG	0.0049	0.0424	-0.1434	0.1778	0.3212	0.3728*	5.5656***	46.40***
SAF	0.0008	0.0359	-0.1119	0.0781	0.1900	-0.2042	2.9899***	1.08
TUN	0.0012	0.0189	-0.0410	0.0847	0.1257	1.1301***	6.561***	115.63***
Av AESMs	-0.0015	0.0278	-0.0866	0.0956	0.1823			
UK	-0.0009	0.0254	-0.1253	0.0604	0.1857	-0.6725***	5.5833***	55.14***
World Index	0.0000	0.0248	-0.0759	0.0530	0.1289	-0.2427	2.5038***	3.13

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 1999 - 2001. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.18A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2002 - 2004

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0008	0.0135	-0.0422	0.0336	0.0757	-0.1463	2.8402***	0.73
EGY	0.0064	0.0370	-0.0999	0.1168	0.2167	-0.1645	3.3106***	1.34
GHA	0.0047	0.0315	-0.0824	0.2065	0.2889	2.6097***	15.9274***	1271.42***
IVC	0.0033	0.0335	-0.1231	0.1571	0.2802	1.6812***	12.6649***	685.02***
KEN	0.0032	0.0356	-0.1846	0.2240	0.4086	0.8471***	16.0212***	1127.92***
MAU	0.0032	0.0172	-0.0342	0.0553	0.0895	0.1552	2.5901***	1.73
MOR	0.0007	0.0222	-0.0748	0.0681	0.1429	-0.2816	3.901***	7.39**
NIG	0.0021	0.0380	-0.1341	0.1624	0.2965	0.4855***	5.2981***	40.72***
SAF	0.0039	0.0297	-0.0880	0.0819	0.1700	-0.4233**	3.4342***	5.92*
TUN	-0.0003	0.0133	-0.0368	0.0483	0.0851	0.2290	4.0661***	8.81**
Av AESMs	0.0026	0.0272	-0.0900	0.1154	0.2054			
UK	-0.0005	0.0270	-0.1218	0.1018	0.2236	-0.5939***	8.0787***	177.96***
World Index	-0.0008	0.0283	-0.0903	0.0944	0.1847	-0.0476	5.1365***	29.92***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 2002 - 2004. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.19A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2005 - 2007

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0067	0.0172	-0.0371	0.0807	0.1178	1.0230***	6.3547***	100.36***
EGY	0.0097	0.0460	-0.1764	0.1538	0.3301	-0.5138***	5.0017***	32.91***
GHA	-0.0011	0.0212	-0.1454	0.0804	0.2258	-2.9418***	22.5908***	2719.70***
IVC	0.0081	0.0312	-0.0660	0.1534	0.2194	2.8513***	12.5004***	798.05***
KEN	0.0050	0.0283	-0.0712	0.1145	0.1857	0.3946**	4.5728***	20.13***
MAU	0.0058	0.0237	-0.0654	0.1109	0.1763	0.9531***	5.8641***	76.94***
MOR	0.0057	0.0307	-0.1405	0.0858	0.2263	-0.9628***	7.6413***	164.12***
NIG	0.0077	0.0318	-0.0754	0.1114	0.1868	0.3908**	3.5444***	5.90*
SAF	0.0031	0.0345	-0.1284	0.0936	0.2220	-0.6710***	3.9896***	18.07***
TUN	0.0040	0.0144	-0.0472	0.0398	0.0871	-0.0280	3.6922***	3.13
Av AESMs	0.0055	0.0279	-0.0953	0.1024	0.1977			
UK	0.0019	0.0151	-0.0434	0.0440	0.0874	-0.2526	3.4328***	2.88
World Index	0.0018	0.0153	-0.0439	0.0433	0.0872	-0.374*	3.5891***	5.89*

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index the three-year sample period 2005 - 2007. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.20A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2008 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0002	0.0227	-0.0824	0.0652	0.1476	-0.4945***	4.2055***	15.90***
EGY	-0.0010	0.0496	-0.2026	0.1123	0.3149	-1.109***	5.4249***	70.65***
GHA	0.0016	0.0357	-0.1435	0.1005	0.2441	-0.4097**	4.6135***	21.42***
IVC	0.0009	0.0254	-0.0907	0.1091	0.1997	0.0228	6.4166***	76.37***
KEN	-0.0013	0.0419	-0.1548	0.1705	0.3253	0.2516	6.0124***	61.02***
MAU	0.0016	0.0317	-0.1276	0.0875	0.2150	-0.3706*	4.5262***	18.83***
MOR	0.0009	0.0329	-0.1999	0.0859	0.2858	-1.3722***	11.3049***	500.46***
NIG	-0.0053	0.0585	-0.2179	0.1732	0.3910	-0.642***	5.8773***	64.94***
SAF	0.0027	0.0503	-0.2148	0.2167	0.4315	-0.3973**	7.2525***	122.43***
TUN	0.0049	0.0197	-0.0531	0.0761	0.1293	0.0098	3.6721***	2.96
Av AESMs	0.0005	0.0368	-0.1487	0.1197	0.2684			
UK	-0.0005	0.0333	-0.0885	0.1669	0.2554	0.3213	6.4085***	78.70***
World Index	0.0002	0.0276	-0.1160	0.0913	0.2073	-0.4465**	5.0559***	32.87***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 2008 - 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.21A

Descriptive Statistics of Weekly Currency Exchanged Returns: 1996 - 2000

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0010	0.0402	-0.1468	0.1201	0.2668	0.0832	4.1224***	13.95***
GHA	-0.0060	0.0277	-0.1211	0.1489	0.2700	0.4552***	10.4436***	609.23***
IVC	-0.0005	0.0310	-0.1772	0.1764	0.3536	-0.0647	16.2703***	1907.93***
KEN	-0.0037	0.0240	-0.1085	0.1146	0.2231	0.5445***	7.2167***	205.47***
MAU	-0.0010	0.0193	-0.0818	0.0735	0.1553	-0.1512	4.7956***	35.92***
MOR	0.0015	0.0206	-0.0651	0.0808	0.1458	0.6985***	5.6411***	96.71***
NIG	0.0019	0.0306	-0.1143	0.1254	0.2397	0.3962***	6.15***	114.29***
SAF	-0.0017	0.0436	-0.2638	0.1300	0.3937	-1.1991***	8.7853***	424.89***
Av AESMs	-0.0011	0.0296	-0.1348	0.1212	0.2560			
UK	0.0019	0.0236	-0.0943	0.0553	0.1497	-0.5825***	4.0968***	27.73***
World Index	0.0021	0.0238	-0.0999	0.0631	0.1630	-0.6039***	4.4094***	37.33***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 1996 - 2000. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.22A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2001 - 2005

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0056	0.0409	-0.1077	0.1538	0.2614	0.1497	3.5431***	4.18
GHA	0.0019	0.0295	-0.1454	0.2065	0.3519	1.2891***	16.9467***	2187.59***
IVC	0.0025	0.0308	-0.1231	0.1571	0.2802	1.8229***	13.9082***	1438.56***
KEN	0.0026	0.0311	-0.1846	0.2240	0.4086	0.8441***	17.0499***	2177.7***
MAU	0.0018	0.0165	-0.0342	0.0553	0.0895	0.2100	2.6509***	3.24
MOR	0.0005	0.0221	-0.0748	0.0790	0.1538	-0.0169	4.0491***	11.98***
NIG	0.0037	0.0380	-0.1434	0.1778	0.3212	0.4693***	6.2615***	125.26***
SAF	0.0028	0.0305	-0.0933	0.0819	0.1752	-0.4013***	3.3469***	8.32**
TUN	-0.0001	0.0136	-0.0368	0.0483	0.0851	0.1980	3.7834***	8.38**
Av AESMs	0.0024	0.0281	-0.1048	0.1315	0.2363			
UK	-0.0003	0.0251	-0.1253	0.1018	0.2271	-0.9134***	9.3838***	479.49***
World Index	-0.0004	0.0258	-0.0903	0.0944	0.1847	-0.1911	5.1877***	53.64***

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 2001 - 2005. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.1.23A

Descriptive Statistics of Weekly Currency Exchanged Returns: 2006 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0027	0.0215	-0.0824	0.0807	0.1630	-0.1213	5.1328***	50.11***
EGY	0.0012	0.0476	-0.2026	0.1123	0.3149	-1.1377***	5.495***	124.00***
GHA	0.0015	0.0289	-0.1435	0.1005	0.2441	-0.3691***	6.6094***	147.60***
IVC	0.0044	0.0284	-0.0907	0.1476	0.2383	1.7518***	11.0245***	833.76***
KEN	0.0004	0.0379	-0.1548	0.1705	0.3253	0.2603*	6.1538***	111.12***
MAU	0.0038	0.0298	-0.1276	0.1109	0.2385	-0.0575	4.9947***	43.41***
MOR	0.0032	0.0343	-0.1999	0.0859	0.2858	-1.1363***	8.7305***	413.29***
NIG	0.0002	0.0501	-0.2179	0.1732	0.3910	-0.7501***	7.1511***	211.87***
SAF	0.0022	0.0456	-0.2148	0.2167	0.4315	-0.4564***	7.0926***	191.21***
TUN	0.0046	0.0180	-0.0531	0.0761	0.1293	-0.0098	3.8699***	8.23**
Av AESMs	0.0024	0.0342	-0.1487	0.1274	0.2762			
UK	0.0003	0.0279	-0.0885	0.1669	0.2554	0.2580*	7.9347***	267.71***
World Index	0.0005	0.0237	-0.1160	0.0913	0.2073	-0.4883***	5.8838***	100.81***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 2006 - 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 5.2 Weekly Local Currency Descriptive Statistics

Table 5.2.1A

Descriptive Statistics of Weekly Local Currency Returns: Whole Period 1996 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0033	0.0432	-0.2278	0.2215	0.4493	-0.4047***	5.8819***	291.98***
GHA	0.0021	0.0241	-0.1579	0.2163	0.3741	1.0426***	23.0875***	13289.33***
IVC	0.0021	0.0279	-0.1960	0.1892	0.3852	1.4319***	18.7881***	8389.13***
KEN	0.0003	0.0263	-0.1312	0.1647	0.2959	0.6499***	9.5162***	1438.57***
MAU	0.0022	0.0191	-0.1117	0.0937	0.2055	0.1025	7.8377***	763.92***
MOR	0.0017	0.0242	-0.1427	0.0867	0.2294	-0.4391***	7.9669***	828.95***
NIG	0.0026	0.0351	-0.1885	0.1761	0.3646	0.0445	8.0364***	826.76***
SAF	0.0019	0.0321	-0.2106	0.1517	0.3624	-0.5455***	7.1773***	607.36***
Av AESMs	0.0020	0.0290	-0.1708	0.1625	0.3333			
UK	0.0006	0.0256	-0.1253	0.1669	0.2922	-0.3347***	7.6032***	705.01***
World Index	0.0007	0.0246	-0.1286	0.1217	0.2503	-0.4652***	5.8757***	297.66***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the 15-year sample period 1996 – 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.2A

Descriptive Statistics of Weekly Local Currency Returns: 1996

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0074	0.0236	-0.0398	0.1073	0.1471	1.5132***	7.8753***	71.34***
GHA	-0.0012	0.0311	-0.0994	0.1641	0.2635	1.8473***	19.3857***	611.30***
IVC	0.0021	0.0255	-0.0889	0.0810	0.1699	-0.0431	7.9078***	52.2***
KEN	-0.0021	0.0117	-0.0415	0.0228	0.0643	-0.9631***	5.0871***	17.47***
MAU	0.0005	0.0177	-0.0508	0.0520	0.1028	0.0112	4.3975***	4.23
MOR	0.0064	0.0117	-0.0142	0.0526	0.0668	1.8763***	8.2489***	90.2***
NIG	0.0067	0.0076	-0.0057	0.0313	0.0370	1.5029***	5.0482***	28.66***
SAF	0.0004	0.0230	-0.0546	0.0644	0.1190	-0.0741	3.3106***	0.25
Av AESMs	0.0025	0.0190	-0.0494	0.0719	0.1213			
UK	0.0021	0.0145	-0.0371	0.0322	0.0693	-0.5124	3.2240***	2.38
World Index	0.0020	0.0126	-0.0296	0.0272	0.0568	-0.4916	2.9545***	2.10

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index the one-year sample period 1996. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.3A

Descriptive Statistics of Weekly Local Currency Returns: 1997

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0043	0.0425	-0.0992	0.1114	0.2106	0.3278	3.2200***	1.03
GHA	-0.0016	0.0209	-0.1032	0.0657	0.1688	-2.2863***	15.7414***	397.04***
IVC	0.0004	0.0316	-0.1467	0.1138	0.2605	-0.919***	14.0645***	272.57***
KEN	0.0000	0.0221	-0.0357	0.1129	0.1486	2.5327***	14.2813***	331.34***
MAU	0.0019	0.0125	-0.0232	0.0294	0.0525	0.2871	2.4035***	1.48
MOR	0.0075	0.0222	-0.0713	0.0636	0.1348	0.0376	5.5855***	14.49***
NIG	-0.0011	0.0193	-0.0316	0.0492	0.0808	0.7799**	2.9460***	5.27*
SAF	-0.0014	0.0372	-0.2106	0.1172	0.3279	-2.8867***	22.2777***	877.42***
Av AESMs	0.0013	0.0260	-0.0902	0.0829	0.1731			
UK	0.0042	0.0229	-0.0943	0.0422	0.1365	-1.4959***	7.9293***	72.04***
World Index	0.0026	0.0187	-0.0691	0.0437	0.1128	-0.8921**	5.6373***	21.97***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1997. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.4A

Descriptive Statistics of Weekly Local Currency Returns: 1998

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0074	0.0239	-0.0595	0.0518	0.1112	0.3632	3.4335***	1.52
GHA	0.0030	0.0317	-0.0993	0.1132	0.2125	0.7101**	8.0601***	58.69***
IVC	0.0001	0.0362	-0.1960	0.1167	0.3127	-2.3931***	20.3514***	688.45***
KEN	-0.0012	0.0184	-0.0486	0.0538	0.1024	0.6670*	5.3421***	15.43***
MAU	0.0032	0.0211	-0.0693	0.0634	0.1327	-0.6523*	6.2144***	25.57***
MOR	0.0030	0.0182	-0.0397	0.0602	0.1000	0.3361	4.0541***	3.32
NIG	-0.0031	0.0067	-0.0206	0.0129	0.0335	-0.0914	3.2668***	0.22
SAF	-0.0031	0.0516	-0.1263	0.1164	0.2427	-0.3267	3.0726***	0.91
TUN	-0.0017	0.0060	-0.0234	0.0134	0.0369	-0.5426	5.1611***	12.42***
Av AESMs	-0.0008	0.0238	-0.0759	0.0669	0.1427			
UK	0.0024	0.0312	-0.0897	0.0524	0.1421	-0.6178*	3.1754***	3.31
World Index	0.0042	0.0279	-0.0761	0.0651	0.1412	-0.6477*	3.4301***	3.96

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1998. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.5A

Descriptive Statistics of Weekly Local Currency Returns: 1999

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0113	0.0398	-0.0757	0.1032	0.1790	0.3215	3.1498***	0.94
GHA	0.0010	0.0117	-0.0232	0.0594	0.0826	3.5373***	18.4123***	623.11***
IVC	-0.0007	0.0135	-0.0702	0.0373	0.1075	-2.2894***	16.1921***	422.49***
KEN	-0.0049	0.0147	-0.0511	0.0400	0.0911	-0.4624	5.1651***	12.01***
MAU	-0.0010	0.0142	-0.0438	0.0339	0.0778	-0.2620	3.7369***	1.77
MOR	-0.0015	0.0151	-0.0470	0.0452	0.0922	0.2400	5.2600***	11.56***
NIG	-0.0004	0.0309	-0.0728	0.1063	0.1791	0.4510	5.5590***	15.95***
SAF	0.0091	0.0308	-0.0476	0.1019	0.1495	0.4990	3.1211***	2.19
TUN	0.0049	0.0177	-0.0272	0.0846	0.1117	2.3369***	11.3835***	199.61***
Av AESMs	0.0020	0.0209	-0.0510	0.0680	0.1189			
UK	0.0026	0.0238	-0.0445	0.0553	0.0999	-0.0592	2.3380***	0.97
World Index	0.0038	0.0207	-0.0406	0.0384	0.0790	-0.2383	1.9894***	2.70

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 1999. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.6A

Descriptive Statistics of Weekly Local Currency Returns: 2000

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0091	0.0499	-0.1450	0.0914	0.2364	-0.1909	2.8475***	0.37
GHA	0.0005	0.0095	-0.0376	0.0535	0.0912	2.1839***	24.686***	1060.28***
IVC	0.0021	0.0300	-0.0614	0.1892	0.2506	4.7393***	30.967***	1889.33***
KEN	-0.0040	0.0137	-0.0622	0.0217	0.0839	-1.6603***	8.2213***	82.96***
MAU	-0.0022	0.0065	-0.0184	0.0103	0.0287	-0.1841	2.5301***	0.77
MOR	-0.0042	0.0207	-0.0490	0.0611	0.1101	0.6776*	4.9207***	11.97***
NIG	0.0111	0.0349	-0.0879	0.1093	0.1972	0.0350	4.1173***	2.72
SAF	-0.0003	0.0345	-0.1142	0.0805	0.1947	-0.3731	4.4259***	5.61*
TUN	0.0037	0.0202	-0.0420	0.0865	0.1285	1.1749***	7.6717***	59.25***
Av AESMs	-0.0003	0.0244	-0.0686	0.0782	0.1468			
UK	-0.0021	0.0233	-0.0490	0.0438	0.0929	-0.0238	2.2832***	1.12
World Index	-0.0029	0.0226	-0.0558	0.0571	0.1129	0.0984	2.9012***	0.11

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2000. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.7A

Descriptive Statistics of Weekly Local Currency Returns: 2001

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0084	0.0380	-0.1075	0.0802	0.1876	-0.0468	3.1625***	0.07
GHA	0.0011	0.0037	-0.0057	0.0191	0.0248	3.1169***	14.3178***	361.73***
IVC	-0.0020	0.0194	-0.0817	0.0921	0.1739	0.5546	17.3629***	449.63***
KEN	-0.0064	0.0161	-0.0494	0.0420	0.0914	0.3153	4.2634***	4.32
MAU	-0.0027	0.0083	-0.0187	0.0211	0.0398	0.2598	3.1753***	0.65
MOR	-0.0021	0.0252	-0.0504	0.0798	0.1302	0.8239**	4.0635***	8.33**
NIG	0.0067	0.0404	-0.1431	0.1691	0.3122	0.3139	9.5255***	93.11***
SAF	0.0044	0.0318	-0.0787	0.0721	0.1508	-0.1475	2.9217***	0.20
TUN	-0.0024	0.0152	-0.0360	0.0450	0.0809	0.2586	4.1635***	3.51
Av AESMs	-0.0013	0.0220	-0.0635	0.0689	0.1324			
UK	-0.0031	0.0288	-0.1253	0.0604	0.1857	-1.2943***	7.8220***	64.89***
World Index	-0.0038	0.0250	-0.0600	0.0482	0.1082	-0.1144	2.7371***	0.26

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2001. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.8A

Descriptive Statistics of Weekly Local Currency Returns: 2002

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0043	0.0160	-0.0396	0.0310	0.0706	0.1352	2.6493***	0.43
EGY	-0.0005	0.0273	-0.0934	0.0491	0.1425	-0.6263*	4.3408***	7.43**
GHA	0.0069	0.0304	-0.0017	0.2163	0.2180	6.3896***	44.2874***	4125.08***
IVC	0.0026	0.0305	-0.0590	0.1394	0.1984	2.3954***	12.2378***	239.14***
KEN	0.0003	0.0237	-0.0424	0.0683	0.1107	1.0408***	4.6206***	15.36***
MAU	0.0031	0.0124	-0.0289	0.0338	0.0627	0.1898	3.0248***	0.31
MOR	-0.0048	0.0215	-0.0695	0.0621	0.1316	-0.2004	5.029***	9.44***
NIG	0.0016	0.0260	-0.0557	0.0921	0.1478	0.8724**	4.741***	13.41***
SAF	-0.0021	0.0270	-0.0615	0.0424	0.1039	-0.2369	2.4023***	1.28
TUN	-0.0022	0.0112	-0.0247	0.0304	0.0551	0.8750**	4.3566***	10.82***
Av AESMs	0.0001	0.0226	-0.0476	0.0765	0.1241			
UK	-0.0052	0.0368	-0.1218	0.1018	0.2236	-0.4119	5.7232***	17.87***
World Index	-0.0042	0.0353	-0.0957	0.0933	0.1889	0.1558	4.0292***	2.55

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2002. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.9A

Descriptive Statistics of Weekly Local Currency Returns: 2003

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0039	0.0202	-0.0460	0.0594	0.1053	0.5421	3.8976***	4.29
EGY	0.0168	0.0516	-0.1189	0.2215	0.3404	0.7103**	6.7184***	34.33***
GHA	0.0100	0.0221	-0.0017	0.0881	0.0898	2.0385***	5.9557***	54.94***
IVC	-0.0020	0.0158	-0.0702	0.0277	0.0979	-2.5550***	11.9285***	229.3***
KEN	0.0134	0.0370	-0.1074	0.1366	0.2440	0.4309	6.1474***	23.07***
MAU	0.0062	0.0148	-0.0367	0.0305	0.0672	-0.6209*	3.5715***	4.04
MOR	0.0041	0.0167	-0.0285	0.0503	0.0788	0.5168	3.3861***	2.63
NIG	0.0100	0.0354	-0.1173	0.1058	0.2230	-0.4316	6.0738***	22.08***
SAF	0.0016	0.0307	-0.0782	0.0750	0.1532	-0.0539	2.925***	0.03
TUN	0.0021	0.0131	-0.0243	0.0439	0.0681	0.6093*	4.1909***	6.29**
Av AESMs	0.0058	0.0257	-0.0629	0.0839	0.1468			
UK	0.0024	0.0251	-0.0683	0.0819	0.1502	-0.0964	4.9024***	7.92**
World Index	0.0051	0.0219	-0.0428	0.0632	0.1060	-0.1099	3.0337***	0.11

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2003. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.10A

Descriptive Statistics of Weekly Local Currency Returns: 2004

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0020	0.0218	-0.0282	0.0799	0.1081	1.2682***	4.94***	22.09***
EGY	0.0145	0.0333	-0.0728	0.1175	0.1903	0.1196	4.1835***	3.15
GHA	0.0065	0.0324	-0.0955	0.1330	0.2285	1.5703***	10.0292***	128.42***
IVC	0.0067	0.0442	-0.1181	0.1630	0.2811	1.4306***	8.8501***	91.89***
KEN	0.0012	0.0227	-0.0716	0.0552	0.1268	-0.5031	4.6704***	8.24**
MAU	0.0047	0.0108	-0.0306	0.0290	0.0596	-0.1669	4.5271***	5.29*
MOR	0.0018	0.0211	-0.0552	0.0644	0.1196	-0.1235	4.3175***	3.89
NIG	0.0025	0.0321	-0.0590	0.0810	0.1400	0.4653	2.8756***	1.91
SAF	0.0033	0.0237	-0.0456	0.0636	0.1092	0.0025	2.7103***	0.18
TUN	0.0012	0.0071	-0.0123	0.0153	0.0276	0.0046	2.0712***	1.86
Av AESMs	0.0044	0.0249	-0.0589	0.0802	0.1391			
UK	0.0014	0.0137	-0.0319	0.0301	0.0620	-0.2218	2.669***	0.66
World Index	0.0024	0.0145	-0.0394	0.0261	0.0656	-0.5484	3.0401***	2.61

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2004. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.11A

Descriptive Statistics of Weekly Local Currency Returns: 2005

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0089	0.0246	-0.0324	0.1436	0.1760	3.0904***	18.3507***	593.33***
EGY	0.0166	0.0435	-0.1161	0.1080	0.2241	0.0398	3.6422***	0.90
GHA	-0.0077	0.0305	-0.1579	0.0132	0.1710	-4.2474***	20.2598***	801.81***
IVC	0.0056	0.0296	-0.0688	0.1505	0.2193	2.4091***	14.2429***	324.17***
KEN	0.0059	0.0184	-0.0433	0.0549	0.0982	0.1741	3.7313***	1.42
MAU	0.0025	0.0111	-0.0336	0.0325	0.0661	-0.0352	4.9100***	7.91**
MOR	0.0039	0.0136	-0.0277	0.0344	0.0620	0.0717	2.5259***	0.53
NIG	0.0038	0.0294	-0.0595	0.1164	0.1759	1.0475***	6.3307***	33.54***
SAF	0.0067	0.0176	-0.0283	0.0375	0.0658	-0.2601	2.1888***	2.01
TUN	0.0037	0.0099	-0.0153	0.0384	0.0537	1.5169***	7.0372***	55.25***
Av AESMs	0.0050	0.0228	-0.0583	0.0729	0.1312			
UK	0.0030	0.0110	-0.0219	0.0308	0.0528	-0.0803	2.9844***	0.05
World Index	0.0015	0.0120	-0.0242	0.0311	0.0554	-0.0083	2.7193***	0.17

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2005. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.12A

Descriptive Statistics of Weekly Local Currency Returns: 2006

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0124	0.0202	-0.0318	0.0674	0.0992	0.3675	3.3804***	1.48
EGY	0.0026	0.0575	-0.1777	0.0987	0.2763	-0.9015**	3.6374***	7.92**
GHA	0.0018	0.0054	-0.0037	0.0221	0.0258	2.6703***	9.0201***	140.32***
IVC	0.0057	0.0270	-0.0382	0.1497	0.1879	3.6751***	19.0188***	673.03***
KEN	0.0062	0.0242	-0.0617	0.0790	0.1407	0.5205	4.3243***	6.14**
MAU	0.0076	0.0230	-0.0674	0.0786	0.1460	0.4446	5.6476***	16.9***
MOR	0.0076	0.0428	-0.1427	0.0844	0.2271	-0.7378**	4.6472***	10.59***
NIG	0.0060	0.0280	-0.0503	0.0822	0.1326	0.6289*	3.3162***	3.64
SAF	0.0047	0.0335	-0.0888	0.0887	0.1775	-0.3147	3.7545***	2.09
TUN	0.0071	0.0134	-0.0312	0.0472	0.0783	0.1798	4.0149***	2.51
Av AESMs	0.0062	0.0275	-0.0694	0.0798	0.1491			
UK	0.0019	0.0157	-0.0434	0.0401	0.0835	-0.5219	3.7905***	3.71
World Index	0.0030	0.0170	-0.0487	0.0433	0.0920	-0.9583***	4.9174***	15.92***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2006. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.13A

Descriptive Statistics of Weekly Local Currency Returns: 2007

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0065	0.0208	-0.0399	0.0720	0.1118	0.0916	3.9945***	2.21
EGY	0.0081	0.0279	-0.0785	0.0527	0.1312	-0.5795*	3.5520***	3.57
GHA	0.0045	0.0145	-0.0042	0.0928	0.0970	4.7556***	28.2178***	1573.87***
IVC	0.0123	0.0353	-0.0083	0.1449	0.1532	2.8030***	9.6622***	164.26***
KEN	-0.0002	0.0318	-0.0726	0.1162	0.1888	0.5974*	5.4367***	15.95***
MAU	0.0081	0.0252	-0.0443	0.0937	0.1380	0.8637**	5.1779***	16.74***
MOR	0.0052	0.0287	-0.1309	0.0559	0.1868	-1.7537***	11.0992***	168.78***
NIG	0.0114	0.0337	-0.0619	0.1144	0.1763	0.6485*	3.9903***	5.76*
SAF	0.0026	0.0261	-0.0717	0.0609	0.1326	-0.4561	3.2073***	1.89
TUN	0.0022	0.0146	-0.0464	0.0344	0.0808	-0.1759	4.5298***	5.33*
Av AESMs	0.0061	0.0259	-0.0559	0.0838	0.1397			
UK	0.0009	0.0178	-0.0402	0.0440	0.0842	0.0209	2.6261***	0.30
World Index	0.0015	0.0177	-0.0396	0.0336	0.0733	-0.557	2.4733***	3.29

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2007. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.14A

Descriptive Statistics of Weekly Local Currency Returns: 2008

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0005	0.0308	-0.0862	0.0959	0.1822	0.1010	4.4593***	4.79*
EGY	-0.0149	0.0638	-0.2278	0.0940	0.3218	-1.1361***	4.569***	16.83***
GHA	0.0034	0.0167	-0.0428	0.0757	0.1185	1.9255***	10.156***	145.83***
IVC	-0.0024	0.0277	-0.0677	0.0858	0.1535	0.3962	5.5635***	15.89***
KEN	-0.0086	0.0476	-0.1312	0.1647	0.2959	0.3563	5.4858***	14.76***
MAU	-0.0083	0.0325	-0.1117	0.0702	0.1819	-0.3190	4.1477***	3.80
MOR	-0.0014	0.0279	-0.0747	0.0652	0.1399	-0.1256	3.5012***	0.69
NIG	-0.0121	0.0549	-0.1885	0.1433	0.3318	-0.1925	4.9709***	8.90**
SAF	-0.0044	0.0442	-0.1353	0.1517	0.2870	0.1284	5.7171***	16.45***
TUN	0.0020	0.0191	-0.0453	0.0625	0.1077	0.1438	4.5663***	5.60*
Av AESMs	-0.0046	0.0365	-0.1111	0.1009	0.2120			
UK	-0.0073	0.0407	-0.0885	0.1669	0.2554	1.1993***	7.7437***	62.4***
World Index	-0.0104	0.0400	-0.1286	0.1217	0.2503	-0.1056	5.242***	11.20***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2008. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.15A

Descriptive Statistics of Weekly Local Currency Returns: 2009

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0019	0.0242	-0.0535	0.0645	0.1179	0.2828	3.2907***	0.87
EGY	0.0060	0.0536	-0.1225	0.1381	0.2606	-0.0522	3.3126***	0.23
GHA	-0.0087	0.0246	-0.0737	0.0454	0.1191	-0.3994	3.3139***	1.59
IVC	-0.0026	0.0130	-0.0325	0.0332	0.0657	0.4949	4.0924***	4.70*
KEN	-0.0013	0.0366	-0.0826	0.1383	0.2210	0.9800***	6.3862***	33.16***
MAU	0.0067	0.0333	-0.0710	0.0905	0.1615	0.2852	2.8634***	0.74
MOR	-0.0024	0.0317	-0.1367	0.0867	0.2234	-1.1115***	8.6424***	79.68***
NIG	-0.0074	0.0644	-0.1722	0.1761	0.3483	0.3021	3.9938***	2.93
SAF	0.0038	0.0329	-0.0757	0.0826	0.1582	-0.1574	2.8663***	0.25
TUN	0.0075	0.0127	-0.0216	0.0337	0.0554	-0.1761	2.6722***	0.50
Av AESMs	0.0000	0.0327	-0.0842	0.0889	0.1731			
UK	0.0041	0.0303	-0.0831	0.0571	0.1402	-0.6733*	3.7999***	5.31*
World Index	0.0048	0.0348	-0.0848	0.0709	0.1558	-0.5021	3.0823***	2.20

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2009. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.16A

Descriptive Statistics of Weekly Local Currency Returns: 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0030	0.0200	-0.0861	0.0444	0.1305	-1.0755***	7.7770***	59.46***
EGY	0.0022	0.0350	-0.1274	0.0814	0.2088	-1.0193***	5.7541***	25.44***
GHA	0.0131	0.0339	-0.1092	0.0963	0.2055	-0.3225	5.5427***	14.91***
IVC	0.0047	0.0171	-0.0730	0.0412	0.1143	-1.4130***	9.7796***	116.89***
KEN	0.0057	0.0219	-0.0405	0.0765	0.1170	1.3303***	5.634***	30.37***
MAU	0.0029	0.0122	-0.0213	0.0341	0.0554	-0.0528	2.7332***	0.17
MOR	0.0033	0.0247	-0.0722	0.0746	0.1468	0.3222	4.7849***	7.80**
NIG	0.0041	0.0313	-0.0699	0.0995	0.1694	0.6197*	4.2915***	6.94**
SAF	0.0030	0.0216	-0.0532	0.0483	0.1014	-0.2124	3.2448***	0.52
TUN	0.0034	0.0136	-0.0358	0.0339	0.0697	-0.3083	3.5192***	1.40
Av AESMs	0.0039	0.0231	-0.0689	0.0630	0.1319			
UK	0.0019	0.0268	-0.0716	0.0598	0.1314	-0.4947	3.5383***	2.74
World Index	0.0015	0.0254	-0.0587	0.0584	0.1171	-0.3027	3.1364***	0.83

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the one-year sample period 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.17A

Descriptive Statistics of Weekly Local Currency Returns: 1996 - 1998

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0015	0.0317	-0.0992	0.1114	0.2106	0.6176***	4.8876***	33.07***
GHA	-0.0003	0.0285	-0.1032	0.1641	0.2672	0.8432***	14.6659***	903.10***
IVC	0.0007	0.0311	-0.1960	0.1167	0.3127	-1.5325***	17.9034***	1504.8***
KEN	-0.0010	0.0178	-0.0486	0.1129	0.1616	1.7896***	13.7206***	830.32***
MAU	0.0019	0.0173	-0.0693	0.0634	0.1327	-0.3082	6.0708***	63.76***
MOR	0.0056	0.0178	-0.0713	0.0636	0.1348	0.3464*	6.3074***	74.22***
NIG	0.0008	0.0133	-0.0316	0.0492	0.0808	0.6746***	4.5855***	28.17***
SAF	-0.0014	0.0386	-0.2106	0.1172	0.3279	-1.1597***	9.5429***	313.23***
Av AESMs	0.0010	0.0245	-0.1037	0.0998	0.2035			
UK	0.0031	0.0237	-0.0943	0.0524	0.1467	-0.9467***	5.4400***	62.00***
World Index	0.0029	0.0205	-0.0761	0.0651	0.1412	-0.6932***	5.0548***	39.94***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 1996 - 1998. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.18A

Descriptive Statistics of Weekly Local Currency Returns: 1999 - 2001

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	-0.0021	0.0436	-0.1450	0.1032	0.2483	-0.0806	3.2963***	0.74
GHA	0.0008	0.0089	-0.0376	0.0594	0.0970	3.5501***	28.3959***	4519.87***
IVC	-0.0002	0.0220	-0.0817	0.1892	0.2709	4.0073***	40.7235***	9667.42***
KEN	-0.0051	0.0148	-0.0622	0.0420	0.1042	-0.4692***	5.3676***	42.16***
MAU	-0.0020	0.0102	-0.0438	0.0339	0.0778	-0.0774	5.1481***	30.15***
MOR	-0.0026	0.0207	-0.0504	0.0798	0.1302	0.7301***	5.0343***	40.76***
NIG	0.0058	0.0357	-0.1431	0.1691	0.3122	0.2978	7.3460***	125.08***
SAF	0.0044	0.0324	-0.1142	0.1019	0.2161	-0.0872	3.7996***	4.35
TUN	0.0021	0.0180	-0.0420	0.0865	0.1285	1.4094***	8.8907***	277.20***
Av AESMs	0.0001	0.0229	-0.0800	0.0961	0.1761			
UK	-0.0009	0.0254	-0.1253	0.0604	0.1857	-0.6725***	5.5833***	55.14***
World Index	-0.0010	0.0230	-0.0600	0.0571	0.1170	-0.1316	2.6567***	1.22

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 1999 - 2001. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.19A

Descriptive Statistics of Weekly Local Currency Returns: 2002 - 2004

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0021	0.0195	-0.0460	0.0799	0.1259	0.8735***	4.8270***	41.8***
EGY	0.0102	0.0393	-0.1189	0.2215	0.3404	0.7041***	8.1353***	185.48***
GHA	0.0078	0.0285	-0.0955	0.2163	0.3118	3.5688***	24.5014***	3357.56***
IVC	0.0024	0.0323	-0.1181	0.1630	0.2811	1.9775***	14.2033***	923.41***
KEN	0.0049	0.0290	-0.1074	0.1366	0.2440	0.6938***	7.1249***	123.9***
MAU	0.0047	0.0127	-0.0367	0.0338	0.0705	-0.2464	3.6283***	4.17
MOR	0.0003	0.0201	-0.0695	0.0644	0.1339	-0.1220	4.7093***	19.5***
NIG	0.0047	0.0314	-0.1173	0.1058	0.2230	0.1988	4.7564***	21.21***
SAF	0.0009	0.0272	-0.0782	0.0750	0.1532	-0.1147	2.8679***	0.45
TUN	0.0003	0.0109	-0.0247	0.0439	0.0686	0.6753***	4.7394***	31.72***
Av AESMs	0.0034	0.0251	-0.0812	0.1140	0.1952			
UK	-0.0005	0.0270	-0.1218	0.1018	0.2236	-0.5939***	8.0786***	177.95***
World Index	0.0011	0.0256	-0.0957	0.0933	0.1889	-0.1827	5.4738***	40.9***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 2004 - 2004. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.20A

Descriptive Statistics of Weekly Local Currency Returns: 2005 - 2007

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0092	0.0220	-0.0399	0.1436	0.1834	1.5307***	11.269***	505.37***
EGY	0.0091	0.0447	-0.1777	0.1080	0.2857	-0.7499***	4.9651***	39.72***
GHA	-0.0004	0.0203	-0.1579	0.0928	0.2506	-4.7969***	43.7755***	11405.48***
IVC	0.0079	0.0308	-0.0688	0.1505	0.2193	2.9591***	13.461***	938.99***
KEN	0.0040	0.0254	-0.0726	0.1162	0.1888	0.4160**	5.7453***	53.49***
MAU	0.0061	0.0207	-0.0674	0.0937	0.1611	0.8867***	6.8938***	118.99***
MOR	0.0055	0.0306	-0.1427	0.0844	0.2271	-1.0206***	8.4409***	219.5***
NIG	0.0071	0.0304	-0.0619	0.1164	0.1783	0.8019***	4.5932***	33.21***
SAF	0.0047	0.0264	-0.0888	0.0887	0.1775	-0.4184**	4.3331***	16.10***
TUN	0.0043	0.0129	-0.0464	0.0472	0.0936	0.2042	5.0022***	27.14***
Av AESMs	0.0058	0.0264	-0.0924	0.1042	0.1965			
UK	0.0019	0.0151	-0.0434	0.0440	0.0874	-0.2526	3.4327***	2.87
World Index	0.0020	0.0157	-0.0487	0.0433	0.0920	-0.6471***	3.7513***	14.55***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 2005 - 2007. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.21A

Descriptive Statistics of Weekly Local Currency Returns: 2008 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	-0.0014	0.0253	-0.0862	0.0959	0.1822	0.02820	5.1658***	30.70***
EGY	-0.0023	0.0527	-0.2278	0.1381	0.3659	-0.9369***	5.5446***	65.32***
GHA	0.0026	0.0273	-0.1092	0.0963	0.2055	0.1072	6.0173***	59.85***
IVC	-0.0001	0.0204	-0.0730	0.0858	0.1588	0.0086	7.6216***	139.72***
KEN	-0.0014	0.0372	-0.1312	0.1647	0.2959	0.3923**	7.0179***	109.63***
MAU	0.0004	0.0283	-0.1117	0.0905	0.2022	-0.0991	4.8585***	22.85***
MOR	-0.0002	0.0282	-0.1367	0.0867	0.2234	-0.5321***	6.7335***	98.59***
NIG	-0.0052	0.0522	-0.1885	0.1761	0.3646	0.0072	5.2616***	33.46***
SAF	0.0008	0.0342	-0.1353	0.1517	0.2870	-0.1179	6.2011***	67.39***
TUN	0.0043	0.0155	-0.0453	0.0625	0.1077	-0.1375	4.5988***	17.21***
Av AESMs	-0.0003	0.0321	-0.1245	0.1148	0.2393			
UK	-0.0005	0.0333	-0.0885	0.1669	0.2554	0.3212	6.4085***	78.70***
World Index	-0.0014	0.0344	-0.1286	0.1217	0.2503	-0.3936**	4.6753***	22.41***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the three-year sample period 2008 - 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.22A

Descriptive Statistics of Weekly Local Currency Returns: 1996 - 2000

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0013	0.0380	-0.1450	0.1114	0.2564	0.0972	4.199***	15.98***
GHA	0.0001	0.0230	-0.1032	0.1641	0.2672	1.0341***	20.7921***	3475.74***
IVC	0.0007	0.0282	-0.1960	0.1892	0.3852	-0.1383	24.0372***	4795.27***
KEN	-0.0024	0.0165	-0.0622	0.1129	0.1752	1.1615***	13.1396***	1172.26***
MAU	0.0005	0.0152	-0.0693	0.0634	0.1327	-0.1762	6.6568***	146.21***
MOR	0.0022	0.0183	-0.0713	0.0636	0.1348	0.3661***	5.5338***	75.36***
NIG	0.0026	0.0235	-0.0879	0.1093	0.1972	0.6029***	7.6991***	254.97***
SAF	0.0009	0.0364	-0.2106	0.1172	0.3279	-0.874***	8.4724***	357.52***
Av AESMs	0.0007	0.0249	-0.1182	0.1164	0.2346			
UK	0.0019	0.0236	-0.0943	0.0553	0.1497	-0.5825***	4.0968***	27.73***
World Index	0.0019	0.0210	-0.0761	0.0651	0.1412	-0.4316***	3.8093***	15.17***

The table shows descriptive statistics for eight African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 1996 - 2000. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.23A

Descriptive Statistics of Weekly Local Currency Returns: 2001 - 2005

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
EGY	0.0078	0.0406	-0.1189	0.2215	0.3404	0.4147***	5.9961***	105.10***
GHA	0.0034	0.0266	-0.1579	0.2163	0.3741	1.3988***	30.1087***	8076.96***
IVC	0.0022	0.0296	-0.1181	0.1630	0.2811	2.0829***	15.6472***	1928.23***
KEN	0.0029	0.0254	-0.1074	0.1366	0.2440	0.7830***	7.9121***	289.07***
MAU	0.0028	0.0120	-0.0367	0.0338	0.0705	-0.0001	3.7181***	5.60*
MOR	0.0006	0.0202	-0.0695	0.0798	0.1493	0.1484	4.6763***	31.52***
NIG	0.0049	0.0329	-0.1431	0.1691	0.3122	0.3835***	7.3280***	210.11***
SAF	0.0028	0.0266	-0.0787	0.0750	0.1536	-0.1771	3.1379***	1.57
TUN	0.0004	0.0118	-0.0360	0.0450	0.0809	0.4617***	5.1841***	61.15***
Av AESMs	0.0031	0.0251	-0.0963	0.1267	0.2229			
UK	-0.0003	0.0251	-0.1253	0.1018	0.2271	-0.9133***	9.3838***	479.48***
World Index	0.0002	0.0234	-0.0957	0.0933	0.1889	-0.1966	5.452***	67.07***

The table shows descriptive statistics for nine African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 2001 - 2005. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.2.24A

Descriptive Statistics of Weekly Local Currency Returns: 2006 - 2010

	Mean	StDev	Min	Max	Spread	Skew	Kurt	Jarque-Bera
BOT	0.0029	0.0241	-0.0862	0.0959	0.1822	-0.0457	4.8436***	37.05***
EGY	0.0007	0.0498	-0.2278	0.1381	0.3659	-1.0188***	5.5939***	118.32***
GHA	0.0028	0.0223	-0.1092	0.0963	0.2055	0.3696***	9.2233***	427.12***
IVC	0.0035	0.0257	-0.0730	0.1497	0.2228	2.5156***	15.3873***	1944.01***
KEN	0.0003	0.0339	-0.1312	0.1647	0.2959	0.3732***	7.0640***	185.67***
MAU	0.0034	0.0269	-0.1117	0.0937	0.2055	0.0620	5.1994***	52.77***
MOR	0.0024	0.0317	-0.1427	0.0867	0.2294	-0.7271***	6.7299***	174.29***
NIG	0.0003	0.0454	-0.1885	0.1761	0.3646	-0.0949	6.0132***	99.13***
SAF	0.0019	0.0325	-0.1353	0.1517	0.2870	-0.2037	5.6099***	75.88***
TUN	0.0044	0.0150	-0.0464	0.0625	0.1089	-0.1153	4.5687***	27.34***
Av AESMs	0.0023	0.0307	-0.1252	0.1215	0.2468			
UK	0.0003	0.0279	-0.0885	0.1669	0.2554	0.2580*	7.9346***	267.71***
World Index	0.0000	0.0288	-0.1286	0.1217	0.2503	-0.5607***	5.9332***	107.24***

The table shows descriptive statistics for ten African emerging stock markets, the UK and the MSCI World Index over the five-year sample period 2006 - 2010. In particular, the table shows the mean weekly return (mean), the standard deviation of the weekly return (StDev), the minimum weekly return (Min) and the maximum weekly return (Max) along with the average African market performance. In addition, the table shows the Kendal-Stuart measure of skewness (Skew) and the Kendal-Stuart measure of kurtosis (Kurt). The table also shows the results from applying the Jarque-Bera test for normality to the weekly return series of each stock market. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 5.3 Currency Exchanged Correlation Coefficients

Table 5.3.1A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1996

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	-0.003	1.000								
IVC	0.101	0.322**	1.000							
KEN	0.167	-0.071	0.279**	1.000						
MAU	0.207	-0.032	0.221	0.172	1.000					
MOR	0.141	0.215	0.195	0.015	0.215	1.000				
NIG	0.319**	-0.035	0.138	0.404***	0.083	0.213	1.000			
SAF	0.013	-0.020	0.023	0.150	0.185	0.151	0.187	1.000		
UK	0.024	0.045	-0.037	0.020	0.073	-0.004	0.232*	0.366***	1.000	
World Index	0.079	0.163	0.232*	0.163	0.130	0.216	0.368***	0.471***	0.648***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the one-year period 1996. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.2A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1997

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.237*	1.000								
IVC	0.013	0.049	1.000							
KEN	0.267*	0.264*	0.308**	1.000						
MAU	0.353**	0.229	0.266*	0.379***	1.000					
MOR	0.330**	0.264*	0.185	0.158	0.355***	1.000				
NIG	0.298**	0.323**	0.103	0.200	0.375***	0.493***	1.000			
SAF	0.387***	0.351**	-0.062	0.278**	0.422***	0.169	0.333**	1.000		
UK	0.172	0.224	-0.086	0.196	0.477***	0.048	0.321**	0.673***	1.000	
World Index	0.257*	0.290**	0.079	0.339**	0.574***	0.129	0.356**	0.693***	0.778***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the one-year period 1997. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.3A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1998

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.182	1.000									
IVC	0.071	-0.166	1.000								
KEN	0.077	-0.049	-0.152	1.000							
MAU	0.160	0.012	0.063	0.091	1.000						
MOR	0.114	0.102	0.116	-0.158	0.208	1.000					
NIG	0.097	0.017	-0.087	0.223	0.322**	-0.011	1.000				
SAF	0.212	0.213	0.059	0.020	0.271*	0.099	0.045	1.000			
TUN	0.251*	0.019	0.243*	0.019	0.261*	0.335**	-0.028	0.141	1.000		
UK	0.065	0.238*	0.076	0.088	0.219	-0.188	-0.025	0.645***	-0.125	1.000	
World Index	0.173	0.333**	0.027	0.090	0.281**	-0.058	0.105	0.701***	0.057	0.911***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 1998. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.4A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1999

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.317**	1.000									
IVC	0.102	0.111	1.000								
KEN	0.156	0.194	0.383***	1.000							
MAU	0.209	0.298**	0.136	0.381***	1.000						
MOR	0.187	0.306**	0.246*	0.142	0.35**	1.000					
NIG	0.123	0.047	0.126	0.010	0.371***	0.237*	1.000				
SAF	0.148	0.253*	0.227	0.379***	0.257*	0.085	0.227	1.000			
TUN	0.146	0.431***	0.142	-0.025	0.118	0.269*	0.000	0.016	1.000		
UK	0.344**	0.114	0.143	0.099	0.208	-0.031	0.129	0.447***	-0.030	1.000	
World Index	0.307**	0.173	0.394***	0.196	0.298**	0.049	0.170	0.438***	0.118	0.765***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 1999. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.5A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2000

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.179	1.000									
IVC	0.226	0.162	1.000								
KEN	0.043	0.064	-0.332**	1.000							
MAU	0.223	0.374***	0.066	0.421***	1.000						
MOR	0.254*	0.152	0.182	-0.124	0.306**	1.000					
NIG	0.002	-0.015	0.069	0.036	0.336**	0.176	1.000				
SAF	0.258*	-0.003	0.005	-0.161	0.080	0.366***	0.233*	1.000			
TUN	0.260*	0.050	0.325**	-0.101	0.182	0.280**	-0.034	0.193	1.000		
UK	0.071	-0.041	-0.105	-0.203	-0.100	0.080	0.059	0.540***	-0.119	1.000	
World Index	0.222	0.146	0.079	-0.114	0.175	0.310**	0.195	0.643***	0.040	0.709***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 2000. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.6A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2001

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.254*	1.000									
IVC	-0.096	0.019	1.000								
KEN	0.121	0.220	0.088	1.000							
MAU	0.196	0.594***	0.164	0.476***	1.000						
MOR	0.071	-0.071	0.224	0.081	0.187	1.000					
NIG	0.186	0.177	0.193	0.141	0.207	0.171	1.000				
SAF	0.252*	0.182	-0.031	0.176	0.332**	0.208	0.256*	1.000			
TUN	0.214	0.072	0.110	0.072	-0.002	0.106	0.026	0.046	1.000		
UK	0.033	0.127	-0.180	0.153	0.158	-0.067	0.037	0.552***	0.155	1.000	
World Index	0.128	0.229	-0.155	0.261*	0.337**	-0.059	0.167	0.73***	0.156	0.806***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 2001. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.7A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2002

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.228*	1.000										
GHA	0.146	0.048	1.000									
IVC	-0.142	0.006	0.424***	1.000								
KEN	-0.041	0.018	0.386***	0.254*	1.000							
MAU	0.670***	0.297**	0.153	-0.161	0.051	1.000						
MOR	0.253*	-0.086	-0.146	-0.066	-0.085	0.214	1.000					
NIG	0.373***	0.283**	0.333**	-0.063	0.113	0.237*	0.031	1.000				
SAF	0.270*	0.079	0.127	0.201	0.135	0.082	0.028	0.128	1.000			
TUN	0.173	0.273**	0.210	0.174	-0.001	0.224	0.027	0.200	-0.036	1.000		
UK	0.381***	-0.095	0.064	0.115	0.047	0.213	0.410***	0.213	0.582***	-0.096	1.000	
World Index	0.427***	-0.024	0.000	0.059	-0.038	0.196	0.393***	0.285**	0.547***	-0.021	0.881***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2002. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.8A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2003

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.262*	1.000										
GHA	0.396***	-0.013	1.000									
IVC	0.008	-0.143	-0.225	1.000								
KEN	0.137	-0.055	0.202	0.266*	1.000							
MAU	0.310**	0.062	0.234*	-0.006	0.146	1.000						
MOR	0.124	-0.131	0.276**	0.313**	0.133	0.103	1.000					
NIG	0.142	0.050	-0.111	0.052	0.065	0.426***	0.086	1.000				
SAF	0.376***	0.024	0.478***	-0.085	0.170	-0.143	0.190	-0.064	1.000			
TUN	0.268*	-0.058	0.275**	0.180	0.300**	0.153	0.482***	0.066	0.227	1.000		
UK	0.302**	0.079	0.189	-0.049	0.080	0.049	-0.012	0.161	0.588***	0.179	1.000	
World Index	0.538***	0.212	0.302**	0.037	0.211	0.137	0.074	0.201	0.650***	0.246*	0.853***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2003. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.9A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2004

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.283**	1.000										
GHA	0.407***	0.143	1.000									
IVC	-0.001	0.104	0.414***	1.000								
KEN	0.230*	0.188	-0.063	-0.213	1.000							
MAU	0.592***	0.266*	0.267*	0.200	0.446***	1.000						
MOR	0.247*	0.339**	0.084	0.082	0.180	0.323**	1.000					
NIG	0.378***	0.024	0.069	-0.183	0.186	0.28**	-0.075	1.000				
SAF	-0.140	0.021	0.011	-0.144	0.137	-0.125	-0.010	-0.093	1.000			
TUN	0.424***	0.315**	0.166	0.190	0.040	0.37***	0.113	0.054	-0.215	1.000		
UK	0.292**	0.365***	0.117	0.054	0.252*	0.243*	0.357***	0.200	0.453***	0.051	1.000	
World Index	0.437***	0.462***	0.174	0.082	0.212	0.383***	0.390***	0.231*	0.434***	0.231	0.847***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2004. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.10A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2005

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.318**	1.000										
GHA	0.302**	0.075	1.000									
IVC	0.063	0.319**	0.053	1.000								
KEN	0.533***	0.239*	0.083	-0.139	1.000							
MAU	0.755***	0.258*	0.226	0.093	0.308**	1.000						
MOR	0.266*	-0.017	0.277**	0.107	0.109	0.358***	1.000					
NIG	0.216	0.050	0.134	0.153	-0.034	0.311**	0.285**	1.000				
SAF	-0.211	0.052	-0.238*	0.268*	-0.030	-0.045	0.052	-0.129	1.000			
TUN	0.558***	0.088	-0.064	0.066	0.180	0.349**	0.225	0.158	-0.152	1.000		
UK	0.106	0.270*	-0.110	0.192	0.164	0.274**	0.176	0.077	0.519***	0.055	1.000	
World Index	0.491***	0.293**	0.031	0.125	0.382***	0.497***	0.216	0.027	0.330**	0.259*	0.688***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2005. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.11A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2006

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.070	1.000										
GHA	0.513***	0.076	1.000									
IVC	0.023	0.131	-0.024	1.000								
KEN	0.069	0.313**	0.108	-0.124	1.000							
MAU	0.316**	-0.018	0.391***	0.004	0.103	1.000						
MOR	-0.114	0.459***	-0.018	0.164	0.300**	-0.084	1.000					
NIG	0.250*	-0.084	0.299**	0.020	-0.221	0.118	-0.074	1.000				
SAF	0.067	0.213	-0.205	0.211	0.090	0.012	0.449***	-0.053	1.000			
TUN	0.210	0.015	0.230	0.121	0.115	0.121	0.057	-0.103	0.024	1.000		
UK	0.194	0.260*	0.094	0.248*	-0.037	0.076	0.427***	0.105	0.660***	0.109	1.000	
World Index	0.282**	0.321**	0.228	0.284**	0.005	0.210	0.423***	0.216	0.611***	0.143	0.905***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2006. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.12A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2007

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.017	1.000										
GHA	0.138	0.253*	1.000									
IVC	0.149	0.033	0.496***	1.000								
KEN	-0.142	0.043	0.274**	0.196	1.000							
MAU	0.062	0.074	0.114	0.075	0.279**	1.000						
MOR	0.078	0.139	0.303**	0.242*	0.064	0.084	1.000					
NIG	0.281**	0.096	0.147	0.218	0.151	0.000	0.147	1.000				
SAF	-0.152	0.272*	-0.048	-0.020	-0.242*	-0.185	0.012	-0.189	1.000			
TUN	0.112	0.198	0.045	0.102	0.247*	0.387***	0.279**	0.179	0.053	1.000		
UK	0.006	0.257*	0.036	0.109	-0.138	-0.045	0.041	-0.063	0.79***	0.180	1.000	
World Index	0.096	0.275**	0.177	0.175	-0.061	0.067	0.238*	-0.043	0.609***	0.34**	0.843***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2007. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.13A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2008

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.180	1.000										
GHA	0.495***	-0.073	1.000									
IVC	-0.029	0.255*	0.226	1.000								
KEN	-0.140	0.315**	0.087	0.108	1.000							
MAU	0.138	0.408***	0.230*	0.189	0.195	1.000						
MOR	-0.307**	0.409***	-0.168	0.275**	0.223	0.248*	1.000					
NIG	0.432***	-0.105	0.409***	0.258*	0.029	0.308**	0.071	1.000				
SAF	-0.264*	0.472***	-0.122	0.227	0.364***	0.076	0.305**	-0.021	1.000			
TUN	0.218	0.443***	0.304**	0.268*	0.184	0.516***	0.323**	0.342**	0.352***	1.000		
UK	-0.350**	0.383***	-0.228*	0.164	0.400***	0.033	0.351***	-0.264*	0.688***	0.108	1.000	
World Index	-0.176	0.510***	-0.020	0.229*	0.263*	0.213	0.273**	-0.140	0.728***	0.301**	0.835***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2008. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.14A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2009

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.133	1.000										
GHA	0.731***	0.071	1.000									
IVC	0.468***	-0.101	0.348**	1.000								
KEN	0.366***	0.066	0.282**	0.202	1.000							
MAU	0.275**	0.391***	0.262*	0.231*	0.322**	1.000						
MOR	0.283**	-0.027	0.149	0.480***	0.096	0.071	1.000					
NIG	0.032	0.23*	-0.089	-0.072	0.031	0.240*	0.275**	1.000				
SAF	-0.388***	0.356***	-0.278**	0.034	0.013	-0.057	-0.155	0.041	1.000			
TUN	0.544***	0.215	0.481***	0.539***	0.363***	0.369***	0.497***	0.161	0.046	1.000		
UK	-0.387***	0.355***	-0.158	-0.132	0.157	0.120	-0.358***	-0.006	0.733***	-0.091	1.000	
World Index	-0.140	0.402***	0.085	0.094	0.307**	0.227	-0.114	-0.001	0.734***	0.228	0.862***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2009. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.15A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.034	1.000										
GHA	0.200	0.085	1.000									
IVC	-0.039	0.018	-0.108	1.000								
KEN	0.013	0.064	0.068	0.068	1.000							
MAU	0.098	0.229	0.031	0.160	0.049	1.000						
MOR	0.023	0.328**	-0.105	0.171	0.166	0.267*	1.000					
NIG	0.218	0.200	0.136	0.056	0.041	0.164	0.151	1.000				
SAF	-0.082	0.507***	-0.057	0.346**	0.014	0.099	0.237*	0.193	1.000			
TUN	0.386***	0.096	0.116	0.074	0.192	0.140	0.121	0.108	0.080	1.000		
UK	-0.291**	0.424***	-0.244*	0.389***	-0.065	0.124	0.343**	0.104	0.846***	-0.022	1.000	
World Index	-0.050	0.413***	-0.169	0.37***	0.109	0.205	0.455***	0.174	0.788***	0.120	0.866***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.16A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1996 - 1998

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.100	1.000								
IVC	0.038	0.058	1.000							
KEN	0.203**	0.053	0.130	1.000						
MAU	0.218***	0.045	0.160**	0.211***	1.000					
MOR	0.241***	0.171**	0.157**	0.044	0.252***	1.000				
NIG	0.271***	0.058	0.029	0.21***	0.242***	0.257***	1.000			
SAF	0.242***	0.172**	0.010	0.146*	0.288***	0.134*	0.166**	1.000		
UK	0.104	0.161**	-0.003	0.129	0.256***	-0.060	0.131	0.615***	1.000	
World Index	0.174**	0.260***	0.079	0.210***	0.329***	0.062	0.213***	0.665***	0.832***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the three-year period 1996-1998. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.17A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1999 - 2001

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.218***	1.000									
IVC	0.100	0.091	1.000								
KEN	0.090	0.143*	0.004	1.000							
MAU	0.219***	0.368***	0.105	0.412***	1.000						
MOR	0.172**	0.107	0.201**	0.033	0.266***	1.000					
NIG	0.066	0.049	0.126	0.071	0.296***	0.183**	1.000				
SAF	0.25***	0.116	0.039	0.136*	0.226***	0.233***	0.218***	1.000			
TUN	0.222***	0.135*	0.227***	-0.022	0.122	0.212***	-0.007	0.105	1.000		
UK	0.154*	0.052	-0.073	0.036	0.105	-0.009	0.060	0.520***	0.004	1.000	
World Index	0.236***	0.160**	0.068	0.130	0.275***	0.090	0.161**	0.617***	0.110	0.768***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the three-year period 1999-2001. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.18A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2002 - 2004

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.259***	1.000										
GHA	0.299***	0.066	1.000									
IVC	-0.042	0.016	0.307***	1.000								
KEN	0.092	0.027	0.159**	0.040	1.000							
MAU	0.492***	0.182**	0.218***	0.021	0.206***	1.000						
MOR	0.212***	0.065	0.061	0.059	0.105	0.217***	1.000					
NIG	0.275***	0.110	0.091	-0.081	0.112	0.343***	0.034	1.000				
SAF	0.193**	0.048	0.179**	0.014	0.139*	-0.047	0.067	0.005	1.000			
TUN	0.268***	0.146*	0.216***	0.153*	0.19**	0.238***	0.233***	0.113	0.021	1.000		
UK	0.327***	0.071	0.107	0.051	0.093	0.150*	0.268***	0.184**	0.556***	0.044	1.000	
World Index	0.445***	0.176**	0.123	0.049	0.127	0.207***	0.301***	0.237***	0.552***	0.134*	0.870***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2002-2004. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.19A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2005 – 2007

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.110	1.000										
GHA	0.245***	0.070	1.000									
IVC	0.080	0.154*	0.178**	1.000								
KEN	0.059	0.193**	0.113	0.020	1.000							
MAU	0.279***	0.065	0.202**	0.072	0.21***	1.000						
MOR	0.004	0.272***	0.135*	0.17**	0.15*	0.030	1.000					
NIG	0.243***	0.008	0.163**	0.156*	-0.005	0.124	0.061	1.000				
SAF	-0.077	0.181**	-0.150*	0.124	-0.082	-0.080	0.240***	-0.121	1.000			
TUN	0.251***	0.067	0.023	0.090	0.192**	0.273***	0.156*	0.077	-0.008	1.000		
UK	0.095	0.243***	-0.021	0.160**	-0.043	0.047	0.237***	0.021	0.684***	0.129	1.000	
World Index	0.249***	0.295***	0.089	0.187**	0.065	0.200**	0.305***	0.059	0.547***	0.248***	0.828***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2005-2007. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.20A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2008 - 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.126	1.000										
GHA	0.441***	0.009	1.000									
IVC	0.117	0.091	0.18**	1.000								
KEN	0.039	0.21***	0.148*	0.129	1.000							
MAU	0.167**	0.385***	0.154*	0.178**	0.231***	1.000						
MOR	0.021	0.192**	0.019	0.328***	0.151*	0.147*	1.000					
NIG	0.225***	0.066	0.141*	0.114	0.042	0.261***	0.181**	1.000				
SAF	-0.265***	0.447***	-0.143*	0.186**	0.227***	0.042	0.099	0.030	1.000			
TUN	0.367***	0.293***	0.264***	0.298***	0.224***	0.384***	0.342***	0.220***	0.201**	1.000		
UK	-0.352***	0.391***	-0.204**	0.117	0.265***	0.095	0.058	-0.106	0.727***	0.009	1.000	
World Index	-0.143*	0.465***	-0.038	0.209***	0.257***	0.225***	0.144*	-0.036	0.739***	0.229***	0.851***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2008-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.21A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 1996 - 2000

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.159**	1.000								
IVC	0.087	0.079	1.000							
KEN	0.143**	0.077	0.084	1.000						
MAU	0.208***	0.132**	0.137**	0.262***	1.000					
MOR	0.229***	0.195***	0.165***	0.041	0.272***	1.000				
NIG	0.102	0.015	0.059	0.101	0.262***	0.192***	1.000			
SAF	0.228***	0.149**	0.026	0.131**	0.254***	0.153**	0.169***	1.000		
UK	0.152**	0.124**	-0.011	0.078	0.194***	-0.010	0.089	0.564***	1.000	
World Index	0.220***	0.229***	0.109*	0.158**	0.300***	0.119*	0.170***	0.619***	0.795***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the five-year period 1996-2000. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.22A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2001 - 2005

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.071	1.000									
IVC	0.086	0.224***	1.000								
KEN	0.108*	0.139**	0.032	1.000							
MAU	0.226***	0.254***	0.064	0.263***	1.000						
MOR	0.074	0.059	0.099	0.112*	0.233***	1.000					
NIG	0.110*	0.101	0.001	0.094	0.297***	0.099	1.000				
SAF	0.119*	0.092	0.058	0.134**	0.042	0.115*	0.051	1.000			
TUN	0.176***	0.120*	0.138**	0.183***	0.226***	0.207***	0.098	0.015	1.000		
UK	0.094	0.075	0.029	0.114*	0.162***	0.173***	0.135**	0.542***	0.082	1.000	
World Index	0.185***	0.111*	0.030	0.172***	0.257***	0.207***	0.200***	0.567***	0.159**	0.846***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the five-year period 2001-2005. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.3.23A: Currency Exchanged Weekly Correlation Coefficients of Market Returns: 2006 – 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.060	1.000										
GHA	0.388***	0.031	1.000									
IVC	0.124**	0.098	0.186***	1.000								
KEN	0.021	0.197***	0.153**	0.115*	1.000							
MAU	0.181***	0.269***	0.160***	0.139**	0.226***	1.000						
MOR	0.014	0.265***	0.039	0.269***	0.157**	0.092	1.000					
NIG	0.245***	0.054	0.147**	0.136**	0.042	0.222***	0.138**	1.000				
SAF	-0.199***	0.376***	-0.133**	0.139**	0.137**	0.005	0.157**	-0.003	1.000			
TUN	0.299***	0.219***	0.230***	0.208***	0.216***	0.342***	0.266***	0.176***	0.156**	1.000		
UK	-0.241***	0.346***	-0.174***	0.122**	0.193***	0.077	0.105*	-0.083	0.716***	0.037	1.000	
World Index	-0.059	0.412***	-0.008	0.200***	0.192***	0.202***	0.194***	-0.014	0.706***	0.231***	0.853***	1.000

The table shows the Weekly currency exchanged Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the five-year period 2006-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 5.4 Local Currency Correlation Coefficients

Table 5.4.1A: Local Currency Weekly Correlation Coefficients of Market Returns: Whole Period 1996 - 2010

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.031	1.000								
IVC	0.046	0.151***	1.000							
KEN	0.127***	0.018	0.009	1.000						
MAU	0.190***	0.019	0.030	0.158***	1.000					
MOR	0.169***	-0.018	0.052	0.051	0.066*	1.000				
NIG	0.048	0.003	0.062*	-0.003	0.150***	0.100***	1.000			
SAF	0.250***	0.020	0.069*	0.096***	0.125***	0.125***	0.041	1.000		
UK	0.212***	0.002	0.055	0.13***	0.105***	0.109***	0.014	0.583***	1.000	
World Index	0.279***	0.008	0.069*	0.141***	0.147***	0.115***	0.022	0.621***	0.832***	1.000

The table shows the Weekly local currency Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the 15-year period 1996-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.2A: Local Currency Weekly Correlation Coefficients of Market Returns: 1996

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	-0.047	1.000								
IVC	-0.063	0.239*	1.000							
KEN	0.024	-0.246*	0.115	1.000						
MAU	0.155	-0.122	0.023	0.079	1.000					
MOR	-0.014	0.080	-0.054	-0.208	0.039	1.000				
NIG	0.123	0.025	0.203	0.282**	-0.031	-0.059	1.000			
SAF	-0.154	-0.106	-0.017	-0.035	0.184	0.176	-0.142	1.000		
UK	-0.059	0.055	0.020	-0.178	0.023	0.053	-0.092	0.235*	1.000	
World Index	-0.058	0.109	0.072	-0.080	-0.009	0.012	0.010	0.195	0.657***	1.000

The table shows the Weekly local currency Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the one-year period 1996. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.3A: Local Currency Weekly Correlation Coefficients of Market Returns: 1997

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.020	1.000								
IVC	-0.018	-0.107	1.000							
KEN	0.065	0.189	-0.019	1.000						
MAU	0.108	-0.117	0.166	0.048	1.000					
MOR	0.210	-0.027	0.047	0.028	0.138	1.000				
NIG	0.133	0.031	0.097	0.035	0.029	0.606***	1.000			
SAF	0.220	0.194	-0.104	0.091	0.179	0.062	0.078	1.000		
UK	0.027	-0.057	-0.173	0.097	0.190	-0.089	0.005	0.605***	1.000	
World Index	0.025	-0.108	0.080	0.125	0.238*	-0.139	-0.027	0.606***	0.643***	1.000

The table shows the Weekly local currency Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the one-year period 1997. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.4A: Local Currency Weekly Correlation Coefficients of Market Returns: 1998

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.137	1.000									
IVC	0.029	-0.130	1.000								
KEN	-0.072	-0.020	-0.152	1.000							
MAU	-0.016	-0.020	-0.071	-0.099	1.000						
MOR	0.033	0.122	-0.002	-0.095	0.091	1.000					
NIG	-0.045	-0.024	-0.219	0.070	0.135	0.100	1.000				
SAF	0.119	0.085	0.122	-0.168	0.327**	0.019	-0.002	1.000			
TUN	0.169	0.063	-0.072	0.144	-0.021	0.073	0.129	-0.069	1.000		
UK	0.000	0.142	0.136	-0.003	0.178	-0.151	-0.214	0.660***	-0.092	1.000	
World Index	0.065	0.225	0.037	-0.054	0.111	-0.118	-0.081	0.692***	-0.072	0.918***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 1998. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.5A: Local Currency Weekly Correlation Coefficients of Market Returns: 1999

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.311**	1.000									
IVC	0.012	-0.040	1.000								
KEN	-0.055	-0.052	0.134	1.000							
MAU	0.046	-0.026	-0.127	0.019	1.000						
MOR	0.125	0.107	-0.074	-0.210	0.206	1.000					
NIG	0.068	-0.005	0.098	-0.012	0.373***	0.172	1.000				
SAF	0.056	0.068	0.128	0.253*	0.080	-0.079	0.085	1.000			
TUN	0.085	0.395***	-0.096	-0.076	-0.004	0.060	-0.137	0.002	1.000		
UK	0.285**	0.052	0.217	0.004	0.056	-0.056	0.121	0.346**	-0.025	1.000	
World Index	0.213	0.076	0.309**	-0.144	-0.051	-0.166	0.065	0.246*	-0.029	0.75***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 1999. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.6A: Local Currency Weekly Correlation Coefficients of Market Returns: 2000

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.184	1.000									
IVC	0.086	0.103	1.000								
KEN	-0.049	0.028	-0.019	1.000							
MAU	0.041	0.232*	-0.001	0.026	1.000						
MOR	0.109	-0.298**	-0.009	-0.202	-0.002	1.000					
NIG	-0.218	-0.037	0.197	-0.019	-0.032	0.145	1.000				
SAF	0.236*	-0.095	-0.042	-0.104	-0.035	0.389***	0.046	1.000			
TUN	0.147	-0.077	0.210	-0.067	0.101	0.073	-0.089	0.138	1.000		
UK	0.081	-0.031	-0.070	-0.113	-0.133	0.137	-0.060	0.55***	-0.045	1.000	
World Index	0.126	-0.106	-0.017	-0.090	-0.223	0.186	-0.025	0.611***	-0.030	0.729***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 2000. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.7A: Local Currency Weekly Correlation Coefficients of Market Returns: 2001

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.098	1.000									
IVC	-0.098	-0.409***	1.000								
KEN	-0.035	0.115	-0.058	1.000							
MAU	-0.037	0.030	0.069	0.058	1.000						
MOR	0.155	-0.167	0.108	0.019	0.113	1.000					
NIG	0.029	-0.093	0.074	0.071	0.117	0.143	1.000				
SAF	0.188	-0.092	-0.035	-0.072	0.098	0.231*	0.146	1.000			
TUN	0.306**	0.171	0.002	-0.003	-0.126	-0.008	-0.098	0.158	1.000		
UK	-0.001	0.113	-0.159	0.081	0.035	-0.030	-0.017	0.529***	0.120	1.000	
World Index	0.040	0.098	-0.179	0.105	0.088	-0.017	0.058	0.706***	0.155	0.803***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the one-year period 2001. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.8A: Local Currency Weekly Correlation Coefficients of Market Returns: 2002

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.014	1.000										
GHA	-0.217	-0.104	1.000									
IVC	-0.056	-0.001	0.476***	1.000								
KEN	-0.232*	0.004	0.298**	0.244*	1.000							
MAU	0.311**	0.113	-0.104	-0.151	-0.014	1.000						
MOR	0.198	-0.261*	-0.245*	-0.148	-0.142	0.102	1.000					
NIG	-0.038	0.127	0.253*	-0.046	0.072	-0.028	-0.111	1.000				
SAF	-0.026	0.035	-0.033	0.142	0.138	0.061	0.015	-0.061	1.000			
TUN	0.066	0.173	0.050	0.101	-0.097	0.139	-0.161	0.095	-0.201	1.000		
UK	0.126	-0.192	0.008	0.095	-0.075	0.043	0.373***	0.048	0.515***	-0.210	1.000	
World Index	0.063	-0.161	-0.039	0.083	-0.093	-0.003	0.322**	0.094	0.528***	-0.149	0.852***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2002. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.9A: Local Currency Weekly Correlation Coefficients of Market Returns: 2003

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.082	1.000										
GHA	-0.117	0.073	1.000									
IVC	0.226	-0.358***	-0.407***	1.000								
KEN	-0.148	-0.097	-0.045	0.26*	1.000							
MAU	0.141	0.25*	0.053	0.013	0.091	1.000						
MOR	-0.133	-0.185	0.137	0.057	0.009	-0.063	1.000					
NIG	0.136	0.008	-0.358***	0.056	-0.007	0.174	-0.039	1.000				
SAF	0.631***	-0.101	0.103	0.176	-0.051	-0.023	0.071	0.121	1.000			
TUN	-0.099	-0.123	0.066	-0.027	0.166	-0.055	0.213	-0.101	0.033	1.000		
UK	0.266*	0.040	-0.001	0.049	-0.016	-0.194	-0.003	0.157	0.636***	0.193	1.000	
World Index	0.210	0.091	-0.020	0.190	0.179	-0.078	-0.004	0.081	0.619***	0.201	0.821***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2003. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.10A: Local Currency Weekly Correlation Coefficients of Market Returns: 2004

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	0.059	1.000										
GHA	0.125	0.045	1.000									
IVC	0.034	0.056	0.459***	1.000								
KEN	-0.049	0.053	-0.214	-0.279**	1.000							
MAU	0.323**	0.000	0.142	0.112	0.301**	1.000						
MOR	0.211	0.174	0.029	0.035	-0.011	0.051	1.000					
NIG	0.221	-0.078	0.025	-0.185	0.165	0.188	-0.144	1.000				
SAF	0.191	0.116	0.159	0.068	-0.039	0.090	0.124	-0.074	1.000			
TUN	0.231*	0.140	0.172	0.094	-0.082	0.236*	-0.207	0.056	0.111	1.000		
UK	0.058	0.255*	0.015	0.006	-0.003	-0.075	0.27*	0.067	0.315**	-0.236*	1.000	
World Index	-0.142	0.329**	-0.001	0.028	-0.033	-0.022	0.178	0.121	0.516***	-0.051	0.703***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2004. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.11A: Local Currency Weekly Correlation Coefficients of Market Returns: 2005

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.011	1.000										
GHA	0.009	-0.029	1.000									
IVC	-0.086	0.304**	0.071	1.000								
KEN	0.235*	0.114	-0.162	-0.160	1.000							
MAU	0.019	0.012	0.043	0.025	-0.184	1.000						
MOR	0.173	-0.107	0.252*	0.074	-0.073	0.124	1.000					
NIG	-0.021	-0.005	0.121	0.136	-0.052	0.232*	0.213	1.000				
SAF	-0.171	0.199	-0.122	0.277**	-0.008	0.205	0.140	0.033	1.000			
TUN	0.069	-0.128	-0.236*	0.031	-0.103	-0.190	-0.004	0.024	-0.314**	1.000		
UK	-0.114	0.232*	-0.175	0.152	0.085	0.241*	0.095	0.016	0.547***	-0.043	1.000	
World Index	-0.344**	0.142	-0.055	0.108	0.055	0.123	0.038	0.040	0.597***	-0.152	0.584***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2005. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.12A: Local Currency Weekly Correlation Coefficients of Market Returns: 2006

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.071	1.000										
GHA	-0.021	0.149	1.000									
IVC	0.031	0.113	-0.202	1.000								
KEN	-0.178	0.258*	0.098	-0.088	1.000							
MAU	0.095	-0.015	0.073	-0.050	0.083	1.000						
MOR	-0.284**	0.465***	0.004	0.153	0.204	-0.076	1.000					
NIG	0.063	-0.077	-0.006	-0.003	-0.226	-0.003	-0.071	1.000				
SAF	-0.044	0.263*	-0.055	0.153	0.000	0.095	0.42***	-0.008	1.000			
TUN	-0.036	0.038	0.364***	0.077	0.196	0.026	0.052	-0.135	-0.090	1.000		
UK	0.016	0.245*	0.031	0.195	-0.159	0.070	0.401***	0.088	0.597***	0.015	1.000	
World Index	-0.120	0.388***	0.089	0.197	0.030	0.103	0.441***	0.116	0.715***	0.135	0.812***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2006. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.13A: Local Currency Weekly Correlation Coefficients of Market Returns: 2007

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.066	1.000										
GHA	-0.103	0.183	1.000									
IVC	0.171	-0.010	0.563***	1.000								
KEN	-0.246*	0.017	0.194	0.154	1.000							
MAU	-0.049	0.000	-0.032	0.019	0.214	1.000						
MOR	0.045	0.038	0.168	0.229	-0.053	-0.059	1.000					
NIG	0.312**	0.114	0.110	0.256*	0.037	-0.132	0.136	1.000				
SAF	-0.286**	0.356***	0.325**	-0.018	0.061	-0.065	0.078	-0.009	1.000			
TUN	0.080	0.200	0.046	0.005	0.099	0.358***	0.205	0.214	0.092	1.000		
UK	-0.231*	0.306**	0.328**	0.106	-0.030	0.003	0.049	-0.006	0.732***	0.218	1.000	
World Index	-0.248*	0.299**	0.313**	0.101	-0.094	0.009	0.087	-0.030	0.714***	0.289**	0.896***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2007. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.14A: Local Currency Weekly Correlation Coefficients of Market Returns: 2008

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.430***	1.000										
GHA	-0.008	0.051	1.000									
IVC	0.005	0.182	0.359***	1.000								
KEN	-0.274**	0.398***	0.109	-0.046	1.000							
MAU	-0.150	0.378***	0.105	0.081	0.187	1.000						
MOR	-0.206	0.473***	-0.032	0.071	0.381***	0.355***	1.000					
NIG	-0.065	-0.116	0.138	0.257*	-0.073	0.132	0.064	1.000				
SAF	-0.557***	0.594***	0.074	0.157	0.446***	0.167	0.335**	-0.100	1.000			
TUN	-0.258*	0.412***	0.167	0.071	0.204	0.384***	0.248*	0.092	0.249*	1.000		
UK	-0.386***	0.445***	0.032	0.140	0.484***	0.138	0.39***	-0.205	0.721***	0.277**	1.000	
World Index	-0.478***	0.604***	0.080	0.102	0.395***	0.23*	0.385***	-0.251*	0.800***	0.253*	0.873***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2008. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.15A: Local Currency Weekly Correlation Coefficients of Market Returns: 2009

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.388***	1.000										
GHA	0.270*	0.012	1.000									
IVC	0.140	-0.164	0.135	1.000								
KEN	-0.078	0.077	-0.036	0.075	1.000							
MAU	-0.042	0.428***	0.114	0.018	0.265*	1.000						
MOR	-0.112	-0.099	-0.197	-0.132	-0.160	-0.102	1.000					
NIG	-0.179	0.309**	-0.196	-0.271*	-0.047	0.36***	0.188	1.000				
SAF	-0.473***	0.507***	-0.096	-0.034	0.189	0.160	-0.385***	0.119	1.000			
TUN	-0.182	0.219	0.112	-0.075	0.046	0.234*	-0.016	0.121	-0.019	1.000		
UK	-0.464***	0.475***	0.071	-0.051	0.348**	0.262*	-0.352**	0.085	0.729***	0.144	1.000	
World Index	-0.608***	0.540***	0.085	-0.014	0.291**	0.326**	-0.276**	0.112	0.794***	0.135	0.894***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2009. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.16A: Local Currency Weekly Correlation Coefficients of Market Returns: 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.338**	1.000										
GHA	-0.107	0.005	1.000									
IVC	-0.136	0.078	-0.012	1.000								
KEN	-0.166	0.055	-0.049	0.071	1.000							
MAU	-0.156	0.218	0.034	0.120	0.141	1.000						
MOR	-0.102	0.344**	-0.146	-0.029	0.119	0.161	1.000					
NIG	-0.102	0.25*	-0.035	0.077	-0.081	0.118	0.204	1.000				
SAF	-0.499***	0.52***	-0.122	0.239*	-0.016	0.091	0.183	0.302**	1.000			
TUN	0.299**	0.093	-0.024	-0.216	0.059	0.051	-0.014	0.063	0.000	1.000		
UK	-0.542***	0.51***	-0.169	0.312**	-0.042	0.062	0.304**	0.268*	0.86***	-0.090	1.000	
World Index	-0.560***	0.485***	-0.278**	0.261*	0.104	0.174	0.317**	0.231*	0.808***	-0.108	0.931***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the one-year period 2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.17A: Local Currency Weekly Correlation Coefficients of Market Returns: 1996 – 1998

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.018	1.000								
IVC	-0.007	-0.001	1.000							
KEN	0.020	-0.017	-0.050	1.000						
MAU	0.056	-0.070	0.012	-0.007	1.000					
MOR	0.141*	0.052	0.012	-0.047	0.081	1.000				
NIG	0.149*	0.011	0.052	0.053	0.011	0.389***	1.000			
SAF	0.117	0.063	0.026	-0.045	0.248***	0.059	0.032	1.000		
UK	0.004	0.053	0.009	0.018	0.141*	-0.094	-0.066	0.587***	1.000	
World Index	0.015	0.119	0.057	0.010	0.112	-0.106	-0.037	0.604***	0.797***	1.000

The table shows the Weekly local currency Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the three-year period 1996-1998. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.18A: Local Currency Weekly Correlation Coefficients of Market Returns: 1999 – 2001

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.211***	1.000									
IVC	0.018	-0.013	1.000								
KEN	-0.043	0.002	0.006	1.000							
MAU	0.035	0.039	-0.019	0.033	1.000						
MOR	0.131	-0.097	0.020	-0.106	0.107	1.000					
NIG	-0.079	-0.032	0.134*	0.022	0.17**	0.141*	1.000				
SAF	0.186**	-0.017	-0.012	0.016	0.059	0.216***	0.077	1.000			
TUN	0.185**	0.155*	0.097	-0.038	0.004	0.037	-0.108	0.101	1.000		
UK	0.129	0.029	-0.041	0.005	0.016	0.018	-0.004	0.481***	0.028	1.000	
World Index	0.149*	0.009	-0.009	-0.026	-0.031	0.022	0.015	0.543***	0.046	0.767***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the three-year period 1999-2001. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.19A: Local Currency Weekly Correlation Coefficients of Market Returns: 2002 – 2004

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.008	1.000										
GHA	-0.046	0.018	1.000									
IVC	0.053	-0.057	0.337***	1.000								
KEN	-0.142*	-0.014	0.020	0.000	1.000							
MAU	0.239***	0.169**	0.028	-0.006	0.123	1.000						
MOR	0.110	-0.043	-0.046	-0.031	-0.012	0.048	1.000					
NIG	0.119	0.022	-0.012	-0.097	0.080	0.130	-0.078	1.000				
SAF	0.303***	0.001	0.070	0.105	0.009	0.037	0.077	0.014	1.000			
TUN	0.042	0.036	0.086	0.050	0.068	0.080	-0.003	0.009	-0.021	1.000		
UK	0.149*	0.015	0.010	0.047	-0.017	-0.048	0.250***	0.093	0.505***	-0.032	1.000	
World Index	0.061	0.063	-0.018	0.064	0.048	-0.015	0.220***	0.099	0.530***	0.017	0.831***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2002-2004. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.20A: Local Currency Weekly Correlation Coefficients of Market Returns: 2005 – 2007

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.051	1.000										
GHA	-0.022	0.002	1.000									
IVC	0.030	0.131	0.188**	1.000								
KEN	-0.073	0.136*	-0.011	0.000	1.000							
MAU	0.017	-0.018	0.040	0.004	0.105	1.000						
MOR	-0.074	0.261***	0.101	0.152*	0.062	-0.046	1.000					
NIG	0.111	-0.011	0.109	0.158**	-0.071	-0.010	0.047	1.000				
SAF	-0.144*	0.260***	0.013	0.101	0.030	0.035	0.281***	-0.006	1.000			
TUN	0.054	0.019	-0.043	0.021	0.105	0.149*	0.102	0.043	-0.055	1.000		
UK	-0.108	0.242***	0.016	0.136*	-0.046	0.053	0.220***	0.022	0.633***	0.096	1.000	
World Index	-0.219***	0.277***	0.074	0.128	-0.021	0.064	0.256***	0.034	0.686***	0.149*	0.804***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2005-2007. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.21A: Local Currency Weekly Correlation Coefficients of Market Returns: 2008 – 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.401***	1.000										
GHA	0.035	0.004	1.000									
IVC	-0.005	0.088	0.166**	1.000								
KEN	-0.200**	0.259***	0.028	0.022	1.000							
MAU	-0.114	0.401***	0.048	0.070	0.229***	1.000						
MOR	-0.148*	0.22***	-0.097	0.008	0.134*	0.112	1.000					
NIG	-0.119	0.123	-0.023	0.085	-0.041	0.249***	0.153*	1.000				
SAF	-0.521***	0.561***	-0.044	0.133*	0.316***	0.173**	0.042	0.047	1.000			
TUN	-0.112	0.303***	0.022	-0.032	0.135*	0.289***	0.087	0.091	0.139*	1.000		
UK	-0.443***	0.478***	-0.039	0.144*	0.365***	0.197**	0.112	-0.002	0.746***	0.171**	1.000	
World Index	-0.534***	0.575***	-0.056	0.113	0.328***	0.29***	0.115	-0.009	0.796***	0.159**	0.891***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the three-year period 2008-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.22A: Local Currency Weekly Correlation Coefficients of Market Returns: 1996 – 2000

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	UK	World Index
EGY	1.000									
GHA	0.065	1.000								
IVC	0.015	0.005	1.000							
KEN	-0.002	-0.006	-0.009	1.000						
MAU	0.050	-0.055	-0.002	-0.015	1.000					
MOR	0.130**	0.015	-0.001	-0.019	0.111*	1.000				
NIG	-0.049	0.000	0.098	0.090	0.076	0.183***	1.000			
SAF	0.143**	0.050	0.018	-0.043	0.181***	0.093	0.037	1.000		
UK	0.093	0.041	0.010	0.034	0.104*	-0.017	-0.023	0.532***	1.000	
World Index	0.103*	0.083	0.058	-0.030	0.054	-0.024	-0.025	0.539***	0.774***	1.000

The table shows the Weekly local currency Person correlation coefficients for eight African emerging stock markets, the UK and the MSCI World Index over the five-year period 1996-2000. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.23A: Local Currency Weekly Correlation Coefficients of Market Returns: 2001 – 2005

	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
EGY	1.000										
GHA	0.002	1.000									
IVC	0.031	0.238***	1.000								
KEN	0.040	-0.004	-0.014	1.000							
MAU	0.143**	0.054	0.019	0.112*	1.000						
MOR	0.012	-0.009	0.014	0.000	0.075	1.000					
NIG	0.011	0.014	-0.028	0.052	0.131**	0.020	1.000				
SAF	0.069	0.004	0.102*	-0.009	0.052	0.131**	0.054	1.000			
TUN	0.100	-0.007	0.049	0.053	0.016	0.010	-0.026	0.007	1.000		
UK	0.045	-0.016	0.029	0.014	0.000	0.165***	0.052	0.510***	0.024	1.000	
World Index	0.081	-0.014	0.038	0.070	0.032	0.148**	0.078	0.570***	0.050	0.812***	1.000

The table shows the Weekly local currency Person correlation coefficients for nine African emerging stock markets, the UK and the MSCI World Index over the five-year period 2001-2005. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 5.4.24A: Local Currency Weekly Correlation Coefficients of Market Returns: 2006 – 2010

	BOT	EGY	GHA	IVC	KEN	MAU	MOR	NIG	SAF	TUN	UK	World Index
BOT	1.000											
EGY	-0.273***	1.000										
GHA	0.014	0.027	1.000									
IVC	0.074	0.085	0.19***	1.000								
KEN	-0.179***	0.226***	0.047	0.044	1.000							
MAU	-0.040	0.275***	0.038	0.055	0.214***	1.000						
MOR	-0.115*	0.277***	-0.043	0.117*	0.115*	0.049	1.000					
NIG	-0.010	0.101	-0.006	0.127**	-0.038	0.183***	0.114*	1.000				
SAF	-0.380***	0.470***	-0.004	0.101	0.231***	0.128**	0.154**	0.038	1.000			
TUN	-0.054	0.226***	0.035	-0.006	0.141**	0.259***	0.099	0.079	0.091	1.000		
UK	-0.348***	0.417***	-0.007	0.127**	0.273***	0.160***	0.140**	0.008	0.706***	0.157**	1.000	
World Index	-0.424***	0.511***	-0.022	0.114*	0.254***	0.238***	0.158**	0.007	0.757***	0.168***	0.886***	1.000

The table shows the Weekly local currency Person correlation coefficients for ten African emerging stock markets, the UK and the MSCI World Index over the five-year period 2006-2010. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 5.5 Weekly Local Currency Mean Return Per Unit of Risk (MRPUR) Ratios, for Each Country Over Various Time Periods

Table 5.5A

Periods		Index											
		BOT	**EGY**	**GHA**	**IVC**	**KEN**	**MAU**	**MOR**	**NIG**	**SAF**	**TUN**	**UK**	**World Index**
15 Year	**1996 - 2010**	#VALUE!	0.0759 (4)	0.0877 (2)	0.0761 (3)	0.0108 (10)	0.1150 (1)	0.0719 (6)	0.0746 (5)	0.0583 (7)	#VALUE!	0.0244 (9)	0.0284 (8)
One Year Periods	**1996**	#VALUE!	0.3124 (3)	-0.0379 (9)	0.0827 (6)	-0.1766 (10)	0.0283 (7)	0.5435 (2)	0.8758 (1)	0.0187 (8)	#VALUE!	0.1459 (5)	0.1620 (4)
	1997	#VALUE!	0.1016 (5)	-0.0761 (10)	0.0120 (6)	0.0009 (7)	0.1545 (3)	0.3366 (1)	-0.0553 (9)	-0.0385 (8)	#VALUE!	0.1850 (2)	0.1377 (4)
	1998	#VALUE!	-0.3083 (10)	0.0595 (5)	-0.0106 (6)	-0.0564 (7)	0.1513 (2)	0.1652 (1)	-0.4862 (11)	-0.0633 (8)	-0.2768 (9)	0.0908 (4)	0.1512 (3)
	1999	#VALUE!	0.2826 (2)	0.0810 (6)	-0.0487 (8)	-0.3322 (11)	-0.0702 (9)	-0.0974 (10)	-0.0113 (7)	0.2949 (1)	0.2777 (3)	0.1098 (5)	0.1826 (4)
	2000	#VALUE!	-0.1831 (8)	0.0474 (4)	0.0686 (3)	-0.2899 (10)	-0.3334 (11)	-0.2011 (9)	0.3184 (1)	-0.0072 (5)	0.1838 (2)	-0.0908 (6)	-0.1302 (7)
	2001	#VALUE!	-0.2211 (9)	0.2887 (1)	-0.1029 (5)	-0.3955 (11)	-0.3289 (10)	-0.0840 (4)	0.1667 (2)	0.1367 (3)	-0.1603 (8)	-0.1095 (6)	-0.1524 (7)
	2002	-0.2693 (12)	-0.0187 (6)	0.2265 (2)	0.0835 (3)	0.0110 (5)	0.2516 (1)	-0.2227 (11)	0.0619 (4)	-0.0765 (7)	-0.1995 (10)	-0.1399 (9)	-0.1188 (8)
	2003	-0.1952 (12)	0.3262 (4)	0.4517 (1)	-0.1278 (11)	0.3632 (3)	0.4157 (2)	0.2460 (6)	0.2812 (5)	0.0519 (10)	0.1571 (8)	0.0970 (9)	0.2327 (7)
	2004	0.0932 (9)	0.4364 (2)	0.2023 (3)	0.1508 (6)	0.0543 (12)	0.4384 (1)	0.0851 (10)	0.0775 (11)	0.1398 (7)	0.1673 (4)	0.0990 (8)	0.1630 (5)
	2005	0.3608 (4)	0.3820 (1)	-0.2525 (12)	0.1878 (9)	0.3201 (5)	0.2270 (8)	0.2830 (6)	0.1287 (10)	0.3791 (2)	0.3693 (3)	0.2681 (7)	0.1272 (11)
	2006	0.6124 (1)	0.0450 (12)	0.3334 (3)	0.2111 (7)	0.2575 (5)	0.3312 (4)	0.1772 (8)	0.2152 (6)	0.1402 (10)	0.5272 (2)	0.1232 (11)	0.1749 (9)
	2007	0.3116 (5)	0.2891 (6)	0.3140 (4)	0.3487 (1)	-0.0047 (12)	0.3222 (3)	0.1818 (7)	0.3382 (2)	0.0995 (9)	0.1523 (8)	0.0494 (11)	0.0834 (10)
	2008	0.0169 (3)	-0.2332 (10)	0.2038 (1)	-0.0875 (5)	-0.1796 (7)	-0.2545 (11)	-0.0512 (4)	-0.2202 (9)	-0.0987 (6)	0.1044 (2)	-0.1803 (8)	-0.2608 (12)
	2009	-0.0799 (9)	0.1129 (6)	-0.3527 (12)	-0.2031 (11)	-0.0353 (7)	0.2001 (2)	-0.0770 (8)	-0.1153 (10)	0.1151 (5)	0.5899 (1)	0.1351 (4)	0.1389 (3)
	2010	-0.1479 (12)	0.0634 (10)	0.3858 (1)	0.2744 (2)	0.2594 (3)	0.2366 (5)	0.1346 (7)	0.1295 (8)	0.1397 (6)	0.2472 (4)	0.0717 (9)	0.0602 (11)
Three Year Periods	**1996 - 1998**	#VALUE!	0.0461 (6)	-0.0098 (8)	0.0225 (7)	-0.0579 (10)	0.1076 (4)	0.3146 (1)	0.0588 (5)	-0.0366 (9)	#VALUE!	0.1293 (3)	0.1406 (2)
	1999 - 2001	#VALUE!	-0.0479 (8)	0.0923 (4)	-0.0091 (5)	-0.3428 (11)	-0.1932 (10)	-0.1249 (9)	0.1634 (1)	0.1353 (2)	0.1151 (3)	-0.0347 (6)	-0.0432 (7)
	2002 - 2004	-0.1070 (12)	0.2600 (3)	0.2736 (2)	0.0743 (6)	0.1707 (4)	0.3650 (1)	0.0169 (10)	0.1484 (5)	0.0342 (8)	0.0295 (9)	-0.0178 (11)	0.0411 (7)
	2005 - 2007	0.4210 (1)	0.2031 (6)	-0.0217 (12)	0.2554 (4)	0.1570 (9)	0.2932 (3)	0.1814 (7)	0.2323 (5)	0.1761 (8)	0.3354 (2)	0.1281 (10)	0.127 (11)
	2008 - 2010	-0.0569 (11)	-0.0433 (10)	0.0955 (2)	-0.0068 (6)	-0.0385 (8)	0.0131 (4)	-0.0067 (5)	-0.0995 (12)	0.0228 (3)	0.2756 (1)	-0.0144 (7)	-0.0411 (9)
Five Year Periods	**1996 - 2000**	#VALUE!	0.0342 (5)	0.0048 (9)	0.0248 (8)	-0.1445 (10)	0.0316 (6)	0.1215 (1)	0.1116 (2)	0.0252 (7)	#VALUE!	0.0817 (4)	0.0901 (3)
	2001 - 2005	#VALUE!	0.1915 (2)	0.1265 (4)	0.0726 (7)	0.1136 (5)	0.2304 (1)	0.0272 (9)	0.1490 (3)	0.1033 (6)	0.0372 (8)	-0.0132 (11)	0.0076 (10)
	2006 - 2010	0.1199 (5)	0.0150 (8)	0.1276 (3)	0.1364 (2)	0.0103 (9)	0.1249 (4)	0.0766 (6)	0.0075 (11)	0.0590 (7)	0.2955 (1)	0.0097 (10)	0.0012 (12)

The table details the Weekly local currency Mean Return Per Unit of Risk (MRPUR) of each sample stock market index in each test period. The mean is calculated as the equally-weighted average while risk is calculated as standard deviation. The ranking of each country for each of the test periods is shown in parentheses.

Appendix 5.6 Local Currency *Ex-Post* MRPUR-Optimal Portfolios for African Emerging Stock Markets in Each Period

Table 5.6A

Periods		African Markets			Number of Markets in Optimal Portfolio	Optimal Portfolio Market Composition	Average MRPUR Across Sub-Period Group
		Return	StDev	MRPUR			
15 Year	**1996 - 2010**	0.00235	0.01419	0.16525	6	MAU, GHA, MOR, IVC, NIG, EGY	0.16525
One Year Periods	**1996**	0.00654	0.00680	0.96036	2	NIG, MOR	0.53391
	1997	0.00470	0.01345	0.34913	2	MOR, MAU	
	1998	0.00307	0.01426	0.21495	2	MOR, MAU	
	1999	0.00841	0.01858	0.45274	3	SAF, TUN, EGY	
	2000	0.00509	0.01306	0.38996	3	NIG, TUN, GHA	
	2001	0.00106	0.00368	0.28878	1	GHA	
	2002	0.00500	0.01580	0.31622	2	MAU, GHA	
	2003	0.00894	0.01111	0.80470	7	GHA, MAU, NIG, KEN, MOR, EGY, TUN	
	2004	0.00681	0.01236	0.55090	3	MAU, EGY, TUN	
	2005	0.00687	0.00891	0.77057	7	EGY, BOT, SAF, TUN, MOR, KEN, MAU	
	2006	0.00669	0.00779	0.85887	7	BOT, TUN, GHA, MAU, KEN, NIG, IVC	
	2007	0.00849	0.01330	0.63831	6	IVC, MAU, EGY, BOT, NIG, GHA	
	2008	0.00341	0.01671	0.20408	1	GHA	
	2009	0.00751	0.01273	0.59000	1	TUN	
	2010	0.00594	0.00959	0.61908	5	GHA, KEN, IVC, TUN, MAU	
Three Year Periods	**1996 - 1998**	0.00560	0.01780	0.31455	1	MOR	0.38096
	1999 - 2001	0.00328	0.01348	0.24323	4	NIG, TUN, SAF, GHA	
	2002 - 2004	0.00645	0.01407	0.45865	5	MAU, GHA, EGY, KEN, NIG	
	2005 - 2007	0.00617	0.01007	0.61299	7	BOT, TUN, MAU, IVC, SAF, NIG, KEN	
	2008 - 2010	0.00428	0.01554	0.27540	1	TUN	
Five Year Periods	**1996 - 2000**	0.00243	0.01616	0.15003	2	MOR, NIG	0.25626
	2001 - 2005	0.00407	0.01267	0.32136	6	MAU, EGY, NIG, GHA, KEN, SAF	
	2006 - 2010	0.00340	0.01145	0.29740	5	TUN, IVC, BOT, GHA, MAU	

The table summarises the risk-return characteristics of the African *ex-post* Weekly local currency MRPUR-optimal portfolios in each test period. In addition, the table also details the number of markets within each of the optimum portfolios and the composition of the African markets that makeup the optimum portfolios. Finally, the table also shows the average of the MRPUR-optimal portfolios across each of the sub-period groups analysed.

Appendix 5.7 Local Currency *Ex-Post* MRPUR Portfolios for the UK and World Index in Each Period

Table 5.7A

Periods		UK			World Index			Average MRPUR Across Sub-Period Group	
		Return	StDev	MRPUR	Return	StDev	MRPUR	UK	World Index
15 Year	**1996 - 2010**	0.00062	0.02558	0.02440***	0.00070	0.02464	0.02843***	0.02440	0.00070
One Year Periods	**1996**	0.00212	0.01453	0.14591***	0.00205	0.01264	0.16203***	0.05696	0.06344
	1997	0.00423	0.02287	0.18496	0.00257	0.01866	0.13771		
	1998	0.00282	0.03107	0.09076	0.00421	0.02788	0.15118		
	1999	0.00261	0.02376	0.10985**	0.00378	0.02072	0.18258*		
	2000	-0.00212	0.02334	-0.09083***	-0.00294	0.02261	-0.13023**		
	2001	-0.00315	0.02876	-0.10953**	-0.00382	0.02505	-0.15236**		
	2002	-0.00515	0.03682	-0.13987**	-0.00420	0.03533	-0.11885**		
	2003	0.00243	0.02506	0.09697***	0.00509	0.02187	0.23273***		
	2004	0.00136	0.01374	0.09898**	0.00237	0.01455	0.16297**		
	2005	0.00296	0.01104	0.26812***	0.00153	0.01199	0.12723***		
	2006	0.00194	0.01575	0.12317***	0.00297	0.01695	0.17489***		
	2007	0.00088	0.01783	0.04936***	0.00148	0.01769	0.08339***		
	2008	-0.00733	0.04065	-0.18032**	-0.01043	0.04001	-0.26080**		
	2009	0.00410	0.03034	0.13514**	0.00484	0.03483	0.13891**		
	2010	0.00192	0.02679	0.07167***	0.00153	0.02543	0.06017***		
Three Year Periods	**1996 - 1998**	0.00306	0.02366	0.12933*	0.00288	0.02047	0.14058	0.03811	0.04487
	1999 - 2001	-0.00088	0.02537	-0.03469***	-0.00099	0.02297	-0.04323**		
	2002 - 2004	-0.00048	0.02702	-0.01776***	0.00105	0.02563	0.04111***		
	2005 - 2007	0.00193	0.01507	0.12807***	0.00199	0.01566	0.12696***		
	2008 - 2010	-0.00048	0.03334	-0.01440***	-0.00141	0.03442	-0.04105***		
Five Year Periods	**1996 - 2000**	0.00193	0.02362	0.08171	0.00189	0.02103	0.09010	0.02607	0.03296
	2001 - 2005	-0.00033	0.02506	-0.01317***	0.00018	0.02344	0.00757***		
	2006 - 2010	0.00027	0.02791	0.00967***	0.00003	0.02885	0.00120***		

The table details the risk-return characteristics in local currency of the UK-only and MSCI World Index only for each test period. In addition, the table also indicates whether both the individual returns and the MRPUR-optimal portfolio for the African markets is significantly larger than that of the UK-only or the MSCI World Index only in each test period. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level. Finally, the table also shows the average of MRPUR for the UK-only and MSCI World Index only across each of the sub-period groups analysed.

Appendix 5.8 Local Currency Chi-Squared Tests for Market Occurrence in Optimum Portfolios Across all Periods Examined

Table 5.8.1A

Including Botswana and Tunisia				Without Botswana and Tunisia			
Market	**Number of Occurrences in Optimal Portfolio**	**Expected Occurrences in Optimal Portfolios**	**Contribution to total Chi-Squared Value**	**Market**	**Number of Occurrences in Optimal Portfolio**	**Expected Occurrences in Optimal Portfolios**	**Contribution to total Chi-Squared Value**
BOT	5	9.500	2.1316				
EGY	10	9.500	0.0263	**EGY**	10	9.875	0.0016
GHA	14	9.500	2.1316	**GHA**	14	9.875	1.7231
IVC	8	9.500	0.2368	**IVC**	8	9.875	0.3560
KEN	6	9.500	1.2895	**KEN**	6	9.875	1.5206
MAU	15	9.500	3.1842	**MAU**	15	9.875	2.6598
MOR	10	9.500	0.0263	**MOR**	10	9.875	0.0016
NIG	12	9.500	0.6579	**NIG**	12	9.875	0.4573
SAF	4	9.500	3.1842	**SAF**	4	9.875	3.4953
TUN	11	9.500	0.2368				
Total Chi-Squared Value			13.1053	Total Chi-Squared Value			10.2152
Number of Observed Values - 95 **Degrees of Freedom - 9** **P-Value – 0.158**				**Number of Observed Values - 79** **Degrees of Freedom - 7** **P-Value – 0.177**			

Table showing the local currency results of the Chi-Squared Goodness-of-Fit test based on the number of occurrences of each African market in the optimal portfolios over each period examined. Specifically the table indicates the number of occurrences of each market in the optimum portfolios, the expected number of occurrences assuming each market occurred in the optimum portfolio equally and the contribution of each market to the overall Chi-Squared statistic based on the difference between the observed and expected occurrences of each market. In addition, the table also indicated the degrees of freedom for the test and the resulting p-value. The left table details the results of the Chi-Squared test including the markets of Botswana and Tunisia, while the right hand table excludes both Botswana and Tunisia.

Appendix 5.9 Currency Exchanged MRPUR Optimal *K* Country Portfolios

Table 5.9.1A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996

Size	Composition								Return	Standard Deviation	MRPUR
1	NIG								0.00720	0.01417	0.50803
2	NIG	MOR							0.00550	0.01091	0.50399
3	NIG	MOR	EGY						0.00553	0.01221	0.45331
4	NIG	MOR	EGY	IVC					0.00408	0.01255	0.32474
5	NIG	MOR	EGY	IVC	MAU				0.00264	0.01188	0.22219
6	NIG	MOR	EGY	IVC	MAU	KEN			0.00160	0.01106	0.14466
7	NIG	MOR	EGY	IVC	MAU	KEN	SAF		0.00049	0.01120	0.04337
8	NIG	MOR	EGY	IVC	MAU	KEN	SAF	GHA	-0.00036	0.01078	-0.03364

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 1996.

Table 5.9.2A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1997

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00610	0.02450	0.24898
2	MOR	EGY							0.00550	0.02939	0.18714
3	MOR	EGY	MAU						0.00380	0.02268	0.16755
4	MOR	EGY	MAU	NIG					0.00280	0.02036	0.13754
5	MOR	EGY	MAU	NIG	IVC				0.00178	0.01858	0.09579
6	MOR	EGY	MAU	NIG	IVC	SAF			0.00123	0.01976	0.06240
7	MOR	EGY	MAU	NIG	IVC	SAF	KEN		0.00077	0.01970	0.03915
8	MOR	EGY	MAU	NIG	IVC	SAF	KEN	GHA	-0.00011	0.01838	-0.00612

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 1997.

Table 5.9.3A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1998

Size	Composition									Return	Standard Deviation	MRPUR
1	MOR									0.00360	0.01952	0.18447
2	MOR	GHA								0.00270	0.01956	0.13801
3	MOR	GHA	MAU							0.00200	0.01624	0.12312
4	MOR	GHA	MAU	IVC						0.00178	0.01533	0.11578
5	MOR	GHA	MAU	IVC	TUN					0.00120	0.01345	0.08921
6	MOR	GHA	MAU	IVC	TUN	KEN				0.00072	0.01151	0.06226
7	MOR	GHA	MAU	IVC	TUN	KEN	SAF			-0.00040	0.01458	-0.02743
8	MOR	GHA	MAU	IVC	TUN	KEN	SAF	NIG		-0.00119	0.01361	-0.08728
9	MOR	GHA	MAU	IVC	TUN	KEN	SAF	NIG	EGY	-0.00194	0.01327	-0.14657

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 1998.

Table 5.9.4A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1999

Size	Composition									Return	Standard Deviation	MRPUR
1	EGY									0.01200	0.04150	0.28913
2	EGY	SAF								0.01050	0.02898	0.36237
3	EGY	SAF	TUN							0.00800	0.02103	0.38032
4	EGY	SAF	TUN	MAU						0.00585	0.01780	0.32856
5	EGY	SAF	TUN	MAU	MOR					0.00422	0.01570	0.26886
6	EGY	SAF	TUN	MAU	MOR	IVC				0.00307	0.01418	0.21627
7	EGY	SAF	TUN	MAU	MOR	IVC	NIG			0.00241	0.01496	0.16142
8	EGY	SAF	TUN	MAU	MOR	IVC	NIG	GHA		0.00136	0.01441	0.09458
9	EGY	SAF	TUN	MAU	MOR	IVC	NIG	GHA	KEN	0.00042	0.01397	0.03023

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 1999.

Table 5.9.5A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2000

Size	Composition									Return	Standard Deviation	MRPUR
1	NIG									0.01050	0.04257	0.24665
2	NIG	TUN								0.00700	0.02344	0.29858
3	NIG	TUN	IVC							0.00540	0.02090	0.25834
4	NIG	TUN	IVC	MAU						0.00348	0.01721	0.20197
5	NIG	TUN	IVC	MAU	SAF					0.00228	0.01695	0.13453
6	NIG	TUN	IVC	MAU	SAF	MOR				0.00132	0.01626	0.08096
7	NIG	TUN	IVC	MAU	SAF	MOR	KEN			0.00046	0.01368	0.03341
8	NIG	TUN	IVC	MAU	SAF	MOR	KEN	EGY		-0.00081	0.01590	-0.05109
9	NIG	TUN	IVC	MAU	SAF	MOR	KEN	EGY	GHA	-0.00206	0.01491	-0.13791

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2000.

Table 5.9.6A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2001

Size	Composition									Return	Standard Deviation	MRPUR
1	NIG									0.00570	0.04416	0.12908
2	NIG	GHA								0.00350	0.02537	0.13796
3	NIG	GHA	IVC							0.00150	0.01968	0.07621
4	NIG	GHA	IVC	TUN						0.00038	0.01541	0.02433
5	NIG	GHA	IVC	TUN	MOR					-0.00036	0.01444	-0.02493
6	NIG	GHA	IVC	TUN	MOR	SAF				-0.00097	0.01487	-0.06502
7	NIG	GHA	IVC	TUN	MOR	SAF	MAU			-0.00137	0.01374	-0.09984
8	NIG	GHA	IVC	TUN	MOR	SAF	MAU	KEN		-0.00193	0.01303	-0.14779
9	NIG	GHA	IVC	TUN	MOR	SAF	MAU	KEN	EGY	-0.00297	0.01354	-0.21916

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2001.

Table 5.9.7A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2002

Size	Composition										Return	Standard Deviation	MRPUR
1	IVC										0.00380	0.03243	0.11718
2	IVC	MAU									0.00275	0.01672	0.16451
3	IVC	MAU	GHA								0.00267	0.01890	0.14106
4	IVC	MAU	GHA	SAF							0.00253	0.01840	0.13725
5	IVC	MAU	GHA	SAF	BOT						0.00166	0.01572	0.10558
6	IVC	MAU	GHA	SAF	BOT	KEN					0.00112	0.01488	0.07506
7	IVC	MAU	GHA	SAF	BOT	KEN	TUN				0.00060	0.01325	0.04530
8	IVC	MAU	GHA	SAF	BOT	KEN	TUN	NIG			0.00025	0.01314	0.01902
9	IVC	MAU	GHA	SAF	BOT	KEN	TUN	NIG	EGY		-0.00009	0.01517	-0.00586
10	IVC	MAU	GHA	SAF	BOT	KEN	TUN	NIG	EGY	MOR	-0.00051	0.01226	-0.04160

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2002.

Table 5.9.8A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2003

Size	Composition										Return	Standard Deviation	MRPUR
1	MAU										0.00630	0.02020	0.31183
2	MAU	MOR									0.00555	0.01499	0.37022
3	MAU	MOR	EGY								0.00683	0.01716	0.39814
4	MAU	MOR	EGY	GHA							0.00688	0.01555	0.44208
5	MAU	MOR	EGY	GHA	KEN						0.00788	0.01707	0.46169
6	MAU	MOR	EGY	GHA	KEN	SAF					0.00735	0.01604	0.45829
7	MAU	MOR	EGY	GHA	KEN	SAF	NIG				0.00724	0.01591	0.45513
8	MAU	MOR	EGY	GHA	KEN	SAF	NIG	TUN			0.00658	0.01477	0.44520
9	MAU	MOR	EGY	GHA	KEN	SAF	NIG	TUN	IVC		0.00579	0.01347	0.42991
10	MAU	MOR	EGY	GHA	KEN	SAF	NIG	TUN	IVC	BOT	0.00502	0.01278	0.39290

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2003.

Table 5.9.9A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2004

Size	Composition										Return	Standard Deviation	MRPUR
1	EGY										0.01280	0.03495	0.36620
2	EGY	SAF									0.00880	0.02153	0.40880
3	EGY	SAF	MAU								0.00643	0.01593	0.40383
4	EGY	SAF	MAU	BOT							0.00513	0.01333	0.38456
5	EGY	SAF	MAU	BOT	IVC						0.00544	0.01432	0.37980
6	EGY	SAF	MAU	BOT	IVC	NIG					0.00485	0.01310	0.37035
7	EGY	SAF	MAU	BOT	IVC	NIG	MOR				0.00439	0.01251	0.35052
8	EGY	SAF	MAU	BOT	IVC	NIG	MOR	TUN			0.00383	0.01150	0.33260
9	EGY	SAF	MAU	BOT	IVC	NIG	MOR	TUN	GHA		0.00391	0.01241	0.31523
10	EGY	SAF	MAU	BOT	IVC	NIG	MOR	TUN	GHA	KEN	0.00348	0.01188	0.29300

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2004.

Table 5.9.10A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2005

Size	Composition										Return	Standard Deviation	MRPUR
1	BOT										0.00610	0.01337	0.45640
2	BOT	EGY									0.01315	0.02678	0.49103
3	BOT	EGY	SAF								0.01093	0.01995	0.54797
4	BOT	EGY	SAF	KEN							0.01045	0.01741	0.60008
5	BOT	EGY	SAF	KEN	MOR						0.00912	0.01451	0.62843
6	BOT	EGY	SAF	KEN	MOR	TUN					0.00817	0.01269	0.64350
7	BOT	EGY	SAF	KEN	MOR	TUN	NIG				0.00790	0.01213	0.65109
8	BOT	EGY	SAF	KEN	MOR	TUN	NIG	MAU			0.00729	0.01189	0.61271
9	BOT	EGY	SAF	KEN	MOR	TUN	NIG	MAU	IVC		0.00703	0.01200	0.58606
10	BOT	EGY	SAF	KEN	MOR	TUN	NIG	MAU	IVC	GHA	0.00575	0.01167	0.49280

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2005.

Table 5.9.11A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2006

Size	Composition										Return	Standard Deviation	MRPUR
1	BOT										0.00830	0.01872	0.44344
2	BOT	TUN									0.00690	0.01295	0.53270
3	BOT	TUN	KEN								0.00620	0.01238	0.50080
4	BOT	TUN	KEN	IVC							0.00598	0.01140	0.52431
5	BOT	TUN	KEN	IVC	NIG						0.00556	0.01074	0.51775
6	BOT	TUN	KEN	IVC	NIG	MAU					0.00532	0.01087	0.48889
7	BOT	TUN	KEN	IVC	NIG	MAU	MOR				0.00553	0.01158	0.47748
8	BOT	TUN	KEN	IVC	NIG	MAU	MOR	GHA			0.00474	0.01076	0.44024
9	BOT	TUN	KEN	IVC	NIG	MAU	MOR	GHA	SAF		0.00424	0.01160	0.36578
10	BOT	TUN	KEN	IVC	NIG	MAU	MOR	GHA	SAF	EGY	0.00385	0.01356	0.28400

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2006.

Table 5.9.12A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2007

Size	Composition										Return	Standard Deviation	MRPUR
1	IVC										0.01390	0.03581	0.38819
2	IVC	MAU									0.01205	0.02330	0.51710
3	IVC	MAU	NIG								0.01233	0.02079	0.59324
4	IVC	MAU	NIG	EGY							0.01138	0.01768	0.64334
5	IVC	MAU	NIG	EGY	BOT						0.01026	0.01553	0.66052
6	IVC	MAU	NIG	EGY	BOT	SAF					0.00898	0.01374	0.65365
7	IVC	MAU	NIG	EGY	BOT	SAF	MOR				0.00863	0.01349	0.63955
8	IVC	MAU	NIG	EGY	BOT	SAF	MOR	GHA			0.00795	0.01280	0.62124
9	IVC	MAU	NIG	EGY	BOT	SAF	MOR	GHA	TUN		0.00739	0.01216	0.60740
10	IVC	MAU	NIG	EGY	BOT	SAF	MOR	GHA	TUN	KEN	0.00678	0.01216	0.55760

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2007.

Table 5.9.13A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2008

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00700	0.02296	0.30490
2	TUN	GHA									0.00570	0.02018	0.28247
3	TUN	GHA	MOR								0.00520	0.01732	0.30020
4	TUN	GHA	MOR	BOT							0.00453	0.01530	0.29569
5	TUN	GHA	MOR	BOT	IVC						0.00426	0.01539	0.27675
6	TUN	GHA	MOR	BOT	IVC	MAU					0.00287	0.01649	0.17387
7	TUN	GHA	MOR	BOT	IVC	MAU	SAF				0.00189	0.01823	0.10345
8	TUN	GHA	MOR	BOT	IVC	MAU	SAF	KEN			0.00085	0.01945	0.04371
9	TUN	GHA	MOR	BOT	IVC	MAU	SAF	KEN	EGY		-0.00023	0.02222	-0.01050
10	TUN	GHA	MOR	BOT	IVC	MAU	SAF	KEN	EGY	NIG	-0.00114	0.02227	-0.05120

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2008.

Table 5.9.14A
Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2009

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00530	0.01960	0.27040
2	TUN	MAU									0.00560	0.02389	0.23439
3	TUN	MAU	SAF								0.00587	0.02178	0.26933
4	TUN	MAU	SAF	BOT							0.00405	0.01752	0.23121
5	TUN	MAU	SAF	BOT	EGY						0.00408	0.02053	0.19870
6	TUN	MAU	SAF	BOT	EGY	KEN					0.00295	0.02017	0.14628
7	TUN	MAU	SAF	BOT	EGY	KEN	IVC				0.00193	0.01852	0.10416
8	TUN	MAU	SAF	BOT	EGY	KEN	IVC	MOR			0.00118	0.01795	0.06547
9	TUN	MAU	SAF	BOT	EGY	KEN	IVC	MOR	NIG		-0.00014	0.01810	-0.00798
10	TUN	MAU	SAF	BOT	EGY	KEN	IVC	MOR	NIG	GHA	-0.00142	0.01847	-0.07690

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2009.

Table 5.9.15A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	GHA										0.01320	0.03897	0.33876
2	GHA	KEN									0.00920	0.02290	0.40176
3	GHA	KEN	IVC								0.00733	0.01638	0.44758
4	GHA	KEN	IVC	MAU							0.00630	0.01350	0.46676
5	GHA	KEN	IVC	MAU	SAF						0.00618	0.01340	0.46108
6	GHA	KEN	IVC	MAU	SAF	TUN					0.00552	0.01202	0.45880
7	GHA	KEN	IVC	MAU	SAF	TUN	NIG				0.00534	0.01231	0.43403
8	GHA	KEN	IVC	MAU	SAF	TUN	NIG	MOR			0.00500	0.01204	0.41521
9	GHA	KEN	IVC	MAU	SAF	TUN	NIG	MOR	BOT		0.00426	0.01141	0.37307
10	GHA	KEN	IVC	MAU	SAF	TUN	NIG	MOR	BOT	EGY	0.00402	0.01212	0.33170

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 1-year period, 2010.

Table 5.9.16A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996 – 1998

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00450	0.01972	0.22814
2	MOR	NIG							0.00230	0.01587	0.14497
3	MOR	NIG	EGY						0.00183	0.01757	0.10432
4	MOR	NIG	EGY	MAU					0.00120	0.01555	0.07715
5	MOR	NIG	EGY	MAU	IVC				0.00082	0.01480	0.05539
6	MOR	NIG	EGY	MAU	IVC	KEN			0.00030	0.01359	0.02207
7	MOR	NIG	EGY	MAU	IVC	KEN	GHA		-0.00030	0.01427	-0.02103
8	MOR	NIG	EGY	MAU	IVC	KEN	GHA	SAF	-0.00089	0.01516	-0.05853

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 3-year period, 1996 - 1998.

Table 5.9.17A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1999 – 2001

Size	Composition									Return	Standard Deviation	MRPUR
1	NIG									0.00490	0.04230	0.11584
2	NIG	TUN								0.00305	0.02315	0.13173
3	NIG	TUN	SAF							0.00230	0.02163	0.10635
4	NIG	TUN	SAF	IVC						0.00148	0.01837	0.08031
5	NIG	TUN	SAF	IVC	MAU					0.00074	0.01616	0.04578
6	NIG	TUN	SAF	IVC	MAU	MOR				0.00012	0.01671	0.00698
7	NIG	TUN	SAF	IVC	MAU	MOR	EGY			-0.00033	0.01583	-0.02076
8	NIG	TUN	SAF	IVC	MAU	MOR	EGY	GHA		-0.00099	0.01515	-0.06517
9	NIG	TUN	SAF	IVC	MAU	MOR	EGY	GHA	KEN	-0.00153	0.01405	-0.10910

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 3-year period, 1999 - 2001.

Table 5.9.18A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2002 – 2004

Size	Composition										Return	Standard Deviation	MRPUR
1	MAU										0.00320	0.01701	0.18814
2	MAU	EGY									0.00480	0.02161	0.22207
3	MAU	EGY	SAF								0.00450	0.01771	0.25410
4	MAU	EGY	SAF	GHA							0.00455	0.01686	0.26992
5	MAU	EGY	SAF	GHA	IVC						0.00430	0.01600	0.26883
6	MAU	EGY	SAF	GHA	IVC	KEN					0.00412	0.01555	0.26474
7	MAU	EGY	SAF	GHA	IVC	KEN	MOR				0.00363	0.01422	0.25513
8	MAU	EGY	SAF	GHA	IVC	KEN	MOR	NIG			0.00344	0.01397	0.24611
9	MAU	EGY	SAF	GHA	IVC	KEN	MOR	NIG	TUN		0.00302	0.01298	0.23290
10	MAU	EGY	SAF	GHA	IVC	KEN	MOR	NIG	TUN	BOT	0.00264	0.01236	0.21360

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 3-year period, 2002 - 2004.

Table 5.9.19A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2005 – 2007

Size	Composition										Return	Standard Deviation	MRPUR
1	BOT										0.00670	0.01715	0.39078
2	BOT	TUN									0.00535	0.01257	0.42550
3	BOT	TUN	IVC								0.00627	0.01407	0.44530
4	BOT	TUN	IVC	MAU							0.00615	0.01341	0.45875
5	BOT	TUN	IVC	MAU	NIG						0.00646	0.01376	0.46954
6	BOT	TUN	IVC	MAU	NIG	KEN					0.00622	0.01297	0.47948
7	BOT	TUN	IVC	MAU	NIG	KEN	SAF				0.00577	0.01182	0.48842
8	BOT	TUN	IVC	MAU	NIG	KEN	SAF	MOR			0.00576	0.01199	0.48057
9	BOT	TUN	IVC	MAU	NIG	KEN	SAF	MOR	EGY		0.00620	0.01317	0.47065
10	BOT	TUN	IVC	MAU	NIG	KEN	SAF	MOR	EGY	GHA	0.00547	0.01249	0.43790

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 3-year period, 2005 - 2007.

Table 5.9.20A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2008 – 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00490	0.01979	0.24760
2	TUN	IVC									0.00290	0.01841	0.15754
3	TUN	IVC	MAU								0.00247	0.01866	0.13216
4	TUN	IVC	MAU	SAF							0.00253	0.02054	0.12291
5	TUN	IVC	MAU	SAF	GHA						0.00234	0.01853	0.12628
6	TUN	IVC	MAU	SAF	GHA	MOR					0.00210	0.01774	0.11839
7	TUN	IVC	MAU	SAF	GHA	MOR	BOT				0.00177	0.01606	0.11032
8	TUN	IVC	MAU	SAF	GHA	MOR	BOT	KEN			0.00139	0.01664	0.08338
9	TUN	IVC	MAU	SAF	GHA	MOR	BOT	KEN	EGY		0.00112	0.01787	0.06280
10	TUN	IVC	MAU	SAF	GHA	MOR	BOT	KEN	EGY	NIG	0.00048	0.01853	0.02590

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 3-year period, 2008 - 2010.

Table 5.9.21A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996 – 2000

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00150	0.02009	0.07467
2	MOR	NIG							0.00170	0.02003	0.08487
3	MOR	NIG	EGY						0.00147	0.02057	0.07131
4	MOR	NIG	EGY	IVC					0.00098	0.01821	0.05353
5	MOR	NIG	EGY	IVC	MAU				0.00058	0.01625	0.03569
6	MOR	NIG	EGY	IVC	MAU	SAF			0.00020	0.01669	0.01198
7	MOR	NIG	EGY	IVC	MAU	SAF	KEN		-0.00036	0.01592	-0.02243
8	MOR	NIG	EGY	IVC	MAU	SAF	KEN	GHA	-0.00106	0.01513	-0.07024

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 5-year period, 1996 - 2000.

Table 5.9.22A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2001 – 2005

Size	Composition									Return	Standard Deviation	MRPUR
1	EGY									0.00560	0.04060	0.13794
2	EGY	NIG								0.00465	0.02940	0.15819
3	EGY	NIG	SAF							0.00403	0.02307	0.17482
4	EGY	NIG	SAF	IVC						0.00365	0.01950	0.18718
5	EGY	NIG	SAF	IVC	MAU					0.00328	0.01691	0.19394
6	EGY	NIG	SAF	IVC	MAU	KEN				0.00317	0.01600	0.19787
7	EGY	NIG	SAF	IVC	MAU	KEN	GHA			0.00299	0.01535	0.19456
8	EGY	NIG	SAF	IVC	MAU	KEN	GHA	MOR		0.00268	0.01427	0.18747
9	EGY	NIG	SAF	IVC	MAU	KEN	GHA	MOR	TUN	0.00237	0.01319	0.17944

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 5-year period, 2001 - 2005.

Table 5.9.23A

Currency Exchanged Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2006 – 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00460	0.01799	0.25570
2	TUN	IVC									0.00450	0.01843	0.24411
3	TUN	IVC	BOT								0.00390	0.01566	0.24901
4	TUN	IVC	BOT	MAU							0.00388	0.01567	0.24730
5	TUN	IVC	BOT	MAU	MOR						0.00374	0.01571	0.23801
6	TUN	IVC	BOT	MAU	MOR	SAF					0.00348	0.01582	0.22019
7	TUN	IVC	BOT	MAU	MOR	SAF	GHA				0.00320	0.01493	0.21427
8	TUN	IVC	BOT	MAU	MOR	SAF	GHA	KEN			0.00285	0.01515	0.18809
9	TUN	IVC	BOT	MAU	MOR	SAF	GHA	KEN	EGY		0.00267	0.01635	0.16309
10	TUN	IVC	BOT	MAU	MOR	SAF	GHA	KEN	EGY	NIG	0.00242	0.01660	0.14580

The table shows the composition and the risk-return characteristics of the currency exchanged weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 5-year period, 2006 - 2010.

Appendix 5.10 Local Currency Optimal *K* Country Portfolios

Table 5.10.1A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: Whole Period 1996 – 2010

Size	Composition								Return	Standard Deviation	MRPUR
1	MAU								0.00220	0.01913	0.11499
2	MAU	GHA							0.00215	0.01548	0.13892
3	MAU	GHA	MOR						0.00200	0.01317	0.15189
4	MAU	GHA	MOR	IVC					0.00203	0.01280	0.15819
5	MAU	GHA	MOR	IVC	NIG				0.00214	0.01315	0.16271
6	MAU	GHA	MOR	IVC	NIG	EGY			0.00233	0.01412	0.16525
7	MAU	GHA	MOR	IVC	NIG	EGY	SAF		0.00227	0.01394	0.16293
8	MAU	GHA	MOR	IVC	NIG	EGY	SAF	KEN	0.00203	0.01307	0.15491

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the whole 15-year period, 1996 - 2010.

Table 5.10.2A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996

Size	Composition								Return	Standard Deviation	MRPUR
1	NIG								0.00670	0.00765	0.87677
2	NIG	MOR							0.00654	0.00681	0.96036
3	NIG	MOR	EGY						0.00681	0.00930	0.73298
4	NIG	MOR	EGY	SAF					0.00522	0.00860	0.60682
5	NIG	MOR	EGY	SAF	IVC				0.00460	0.00845	0.54411
6	NIG	MOR	EGY	SAF	IVC	MAU			0.00391	0.00817	0.47887
7	NIG	MOR	EGY	SAF	IVC	MAU	KEN		0.00306	0.00733	0.41728
8	NIG	MOR	EGY	SAF	IVC	MAU	KEN	GHA	0.00253	0.00741	0.34107

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 1996.

Table 5.10.3A

Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1997

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00746	0.02216	0.33681
2	MOR	MAU							0.00470	0.01345	0.34913
3	MOR	MAU	KEN						0.00314	0.01187	0.26430
4	MOR	MAU	KEN	EGY					0.00343	0.01523	0.22540
5	MOR	MAU	KEN	EGY	IVC				0.00282	0.01391	0.20299
6	MOR	MAU	KEN	EGY	IVC	GHA			0.00209	0.01208	0.17277
7	MOR	MAU	KEN	EGY	IVC	GHA	NIG		0.00164	0.01157	0.14143
8	MOR	MAU	KEN	EGY	IVC	GHA	NIG	SAF	0.00125	0.01200	0.10439

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 1997.

Table 5.10.4A

Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1998

Size	Composition									Return	Standard Deviation	MRPUR
1	MOR									0.00304	0.01815	0.16760
2	MOR	MAU								0.00312	0.01453	0.21495
3	MOR	MAU	GHA							0.00310	0.01478	0.20947
4	MOR	MAU	GHA	IVC						0.00234	0.01337	0.17538
5	MOR	MAU	GHA	IVC	KEN					0.00163	0.01064	0.15288
6	MOR	MAU	GHA	IVC	KEN	TUN				0.00108	0.00898	0.11991
7	MOR	MAU	GHA	IVC	KEN	TUN	NIG			0.00048	0.00772	0.06233
8	MOR	MAU	GHA	IVC	KEN	TUN	NIG	SAF		0.00003	0.01024	0.00295
9	MOR	MAU	GHA	IVC	KEN	TUN	NIG	SAF	EGY	-0.00079	0.00982	-0.08095

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 1998.

Table 5.10.5A

Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1999

Size	Composition									Return	Standard Deviation	MRPUR
1	SAF									0.00907	0.03076	0.29470
2	SAF	TUN								0.00699	0.01776	0.39356
3	SAF	TUN	EGY							0.00841	0.01858	0.45274
4	SAF	TUN	EGY	GHA						0.00655	0.01531	0.42774
5	SAF	TUN	EGY	GHA	IVC					0.00511	0.01264	0.40399
6	SAF	TUN	EGY	GHA	IVC	MAU				0.00409	0.01088	0.37583
7	SAF	TUN	EGY	GHA	IVC	MAU	MOR			0.00329	0.00979	0.33654
8	SAF	TUN	EGY	GHA	IVC	MAU	MOR	NIG		0.00284	0.01000	0.28384
9	SAF	TUN	EGY	GHA	IVC	MAU	MOR	NIG	KEN	0.00198	0.00908	0.21830

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 1999.

Table 5.10.6A

Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2000

Size	Composition									Return	Standard Deviation	MRPUR
1	NIG									0.01110	0.03485	0.31852
2	NIG	TUN								0.00740	0.01932	0.38294
3	NIG	TUN	GHA							0.00510	0.01308	0.38996
4	NIG	TUN	GHA	MAU						0.00328	0.01006	0.32553
5	NIG	TUN	GHA	MAU	IVC					0.00304	0.01143	0.26603
6	NIG	TUN	GHA	MAU	IVC	SAF				0.00248	0.01127	0.22037
7	NIG	TUN	GHA	MAU	IVC	SAF	KEN			0.00156	0.00966	0.16127
8	NIG	TUN	GHA	MAU	IVC	SAF	KEN	MOR		0.00084	0.00925	0.09055
9	NIG	TUN	GHA	MAU	IVC	SAF	KEN	MOR	EGY	-0.00027	0.01087	-0.02453

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2000.

Table 5.10.7A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2001

Size	Composition									Return	Standard Deviation	MRPUR
1	GHA									0.00106	0.00369	0.28878
2	GHA	NIG								0.00390	0.02009	0.19397
3	GHA	NIG	SAF							0.00405	0.01820	0.22247
4	GHA	NIG	SAF	IVC						0.00254	0.01452	0.17472
5	GHA	NIG	SAF	IVC	TUN					0.00154	0.01210	0.12755
6	GHA	NIG	SAF	IVC	TUN	MAU				0.00083	0.01034	0.08039
7	GHA	NIG	SAF	IVC	TUN	MAU	MOR			0.00041	0.01037	0.03951
8	GHA	NIG	SAF	IVC	TUN	MAU	MOR	KEN		-0.00044	0.00931	-0.04710
9	GHA	NIG	SAF	IVC	TUN	MAU	MOR	KEN	EGY	-0.00132	0.00994	-0.13309

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2001.

Table 5.10.8A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2002

Size	Composition										Return	Standard Deviation	MRPUR
1	MAU										0.00311	0.01236	0.25125
2	MAU	GHA									0.00499	0.01579	0.31622
3	MAU	GHA	NIG								0.00386	0.01511	0.25567
4	MAU	GHA	NIG	IVC							0.00354	0.01518	0.23297
5	MAU	GHA	NIG	IVC	EGY						0.00273	0.01344	0.20291
6	MAU	GHA	NIG	IVC	EGY	KEN					0.00232	0.01286	0.18011
7	MAU	GHA	NIG	IVC	EGY	KEN	TUN				0.00167	0.01137	0.14650
8	MAU	GHA	NIG	IVC	EGY	KEN	TUN	SAF			0.00120	0.01068	0.11217
9	MAU	GHA	NIG	IVC	EGY	KEN	TUN	SAF	BOT		0.00059	0.00943	0.06228
10	MAU	GHA	NIG	IVC	EGY	KEN	TUN	SAF	BOT	MOR	0.00005	0.00813	0.00610

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2002.

Table 5.10.9A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2003

Size	Composition										Return	Standard Deviation	MRPUR
1	GHA										0.01000	0.02214	0.45163
2	GHA	MAU									0.00808	0.01365	0.59208
3	GHA	MAU	NIG								0.00870	0.01341	0.64923
4	GHA	MAU	NIG	KEN							0.00989	0.01368	0.72290
5	GHA	MAU	NIG	KEN	MOR						0.00873	0.01150	0.75908
6	GHA	MAU	NIG	KEN	MOR	EGY					0.01008	0.01276	0.79018
7	GHA	MAU	NIG	KEN	MOR	EGY	TUN				0.00894	0.01111	0.80470
8	GHA	MAU	NIG	KEN	MOR	EGY	TUN	IVC			0.00757	0.00953	0.79380
9	GHA	MAU	NIG	KEN	MOR	EGY	TUN	IVC	SAF		0.00690	0.00928	0.74408
10	GHA	MAU	NIG	KEN	MOR	EGY	TUN	IVC	SAF	BOT	0.00582	0.00891	0.65290

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2003.

Table 5.10.10A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2004

Size	Composition										Return	Standard Deviation	MRPUR
1	MAU										0.00473	0.01079	0.43832
2	MAU	EGY									0.00962	0.01749	0.55031
3	MAU	EGY	TUN								0.00681	0.01236	0.55090
4	MAU	EGY	TUN	GHA							0.00674	0.01299	0.51918
5	MAU	EGY	TUN	GHA	KEN						0.00564	0.01114	0.50666
6	MAU	EGY	TUN	GHA	KEN	SAF					0.00526	0.01072	0.49038
7	MAU	EGY	TUN	GHA	KEN	SAF	MOR				0.00476	0.01004	0.47421
8	MAU	EGY	TUN	GHA	KEN	SAF	MOR	NIG			0.00448	0.00964	0.46456
9	MAU	EGY	TUN	GHA	KEN	SAF	MOR	NIG	IVC		0.00472	0.01034	0.45640
10	MAU	EGY	TUN	GHA	KEN	SAF	MOR	NIG	IVC	BOT	0.00445	0.01017	0.43760

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2004.

Table 5.10.11A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2005

Size	Composition										Return	Standard Deviation	MRPUR
1	EGY										0.01660	0.04346	0.38193
2	EGY	BOT									0.01274	0.02486	0.51260
3	EGY	BOT	SAF								0.01072	0.01806	0.59319
4	EGY	BOT	SAF	TUN							0.00895	0.01334	0.67090
5	EGY	BOT	SAF	TUN	MOR						0.00793	0.01112	0.71370
6	EGY	BOT	SAF	TUN	MOR	KEN					0.00759	0.01020	0.74442
7	EGY	BOT	SAF	TUN	MOR	KEN	MAU				0.00687	0.00891	0.77057
8	EGY	BOT	SAF	TUN	MOR	KEN	MAU	NIG			0.00648	0.00886	0.73160
9	EGY	BOT	SAF	TUN	MOR	KEN	MAU	NIG	IVC		0.00638	0.00930	0.68605
10	EGY	BOT	SAF	TUN	MOR	KEN	MAU	NIG	IVC	GHA	0.00497	0.00894	0.55600

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2005.

Table 5.10.12A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2006

Size	Composition										Return	Standard Deviation	MRPUR
1	BOT										0.01237	0.02020	0.61247
2	BOT	TUN									0.00973	0.01192	0.81570
3	BOT	TUN	GHA								0.00709	0.00848	0.83620
4	BOT	TUN	GHA	MAU							0.00722	0.00901	0.80106
5	BOT	TUN	GHA	MAU	KEN						0.00702	0.00885	0.79354
6	BOT	TUN	GHA	MAU	KEN	NIG					0.00686	0.00816	0.84012
7	BOT	TUN	GHA	MAU	KEN	NIG	IVC				0.00669	0.00779	0.85887
8	BOT	TUN	GHA	MAU	KEN	NIG	IVC	MOR			0.00680	0.00869	0.78301
9	BOT	TUN	GHA	MAU	KEN	NIG	IVC	MOR	SAF		0.00657	0.00956	0.68709
10	BOT	TUN	GHA	MAU	KEN	NIG	IVC	MOR	SAF	EGY	0.00617	0.01216	0.50750

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2006.

Table 5.10.13A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2007

Size	Composition										Return	Standard Deviation	MRPUR
1	IVC										0.01232	0.03533	0.34878
2	IVC	MAU									0.01022	0.02190	0.46669
3	IVC	MAU	EGY								0.00950	0.01724	0.55091
4	IVC	MAU	EGY	BOT							0.00875	0.01422	0.61527
5	IVC	MAU	EGY	BOT	NIG						0.00928	0.01471	0.63057
6	IVC	MAU	EGY	BOT	NIG	GHA					0.00849	0.01330	0.63831
7	IVC	MAU	EGY	BOT	NIG	GHA	MOR				0.00802	0.01284	0.62436
8	IVC	MAU	EGY	BOT	NIG	GHA	MOR	SAF			0.00734	0.01199	0.61238
9	IVC	MAU	EGY	BOT	NIG	GHA	MOR	SAF	TUN		0.00677	0.01131	0.59860
10	IVC	MAU	EGY	BOT	NIG	GHA	MOR	SAF	TUN	KEN	0.00608	0.01102	0.55200

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2007.

Table 5.10.14A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2008

Size	Composition										Return	Standard Deviation	MRPUR
1	GHA										0.00341	0.01673	0.20408
2	GHA	TUN									0.00271	0.01373	0.19730
3	GHA	TUN	BOT								0.00198	0.01242	0.15924
4	GHA	TUN	BOT	MOR							0.00112	0.01132	0.09937
5	GHA	TUN	BOT	MOR	IVC						0.00041	0.01156	0.03588
6	GHA	TUN	BOT	MOR	IVC	SAF					-0.00038	0.01239	-0.03081
7	GHA	TUN	BOT	MOR	IVC	SAF	KEN				-0.00155	0.01450	-0.10684
8	GHA	TUN	BOT	MOR	IVC	SAF	KEN	MAU			-0.00239	0.01452	-0.16443
9	GHA	TUN	BOT	MOR	IVC	SAF	KEN	MAU	EGY		-0.00378	0.01814	-0.20811
10	GHA	TUN	BOT	MOR	IVC	SAF	KEN	MAU	EGY	NIG	-0.00461	0.01722	-0.26750

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2008.

Table 5.10.15A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2009

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00751	0.01273	0.59000
2	TUN	MAU									0.00708	0.01916	0.36968
3	TUN	MAU	SAF								0.00599	0.01792	0.33423
4	TUN	MAU	SAF	BOT							0.00401	0.01260	0.31829
5	TUN	MAU	SAF	BOT	MOR						0.00272	0.00967	0.28118
6	TUN	MAU	SAF	BOT	MOR	EGY					0.00327	0.01442	0.22703
7	TUN	MAU	SAF	BOT	MOR	EGY	IVC				0.00243	0.01226	0.19808
8	TUN	MAU	SAF	BOT	MOR	EGY	IVC	KEN			0.00196	0.01232	0.15944
9	TUN	MAU	SAF	BOT	MOR	EGY	IVC	KEN	GHA		0.00078	0.01138	0.06860
10	TUN	MAU	SAF	BOT	MOR	EGY	IVC	KEN	GHA	NIG	-0.00004	0.01340	-0.00300

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2009.

Table 5.10.16A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	GHA										0.01308	0.03390	0.38597
2	GHA	KEN									0.00938	0.01972	0.47587
3	GHA	KEN	IVC								0.00782	0.01448	0.54017
4	GHA	KEN	IVC	TUN							0.00671	0.01113	0.60230
5	GHA	KEN	IVC	TUN	MAU						0.00594	0.00960	0.61908
6	GHA	KEN	IVC	TUN	MAU	SAF					0.00546	0.00882	0.61845
7	GHA	KEN	IVC	TUN	MAU	SAF	MOR				0.00515	0.00851	0.60507
8	GHA	KEN	IVC	TUN	MAU	SAF	MOR	BOT			0.00414	0.00698	0.59258
9	GHA	KEN	IVC	TUN	MAU	SAF	MOR	BOT	NIG		0.00413	0.00765	0.53966
10	GHA	KEN	IVC	TUN	MAU	SAF	MOR	BOT	NIG	EGY	0.00394	0.00888	0.44320

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 1-year period, 2010.

Table 5.10.17A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996 – 1998

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00560	0.01780	0.31455
2	MOR	MAU							0.00373	0.01290	0.28919
3	MOR	MAU	NIG						0.00275	0.01070	0.25667
4	MOR	MAU	NIG	EGY					0.00243	0.01220	0.19886
5	MOR	MAU	NIG	EGY	IVC				0.00208	0.01167	0.17833
6	MOR	MAU	NIG	EGY	IVC	GHA			0.00169	0.01085	0.15551
7	MOR	MAU	NIG	EGY	IVC	GHA	KEN		0.00130	0.00958	0.13567
8	MOR	MAU	NIG	EGY	IVC	GHA	KEN	SAF	0.00096	0.01035	0.09283

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 3-year period, 1996 - 1998.

Table 5.10.18A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1999 – 2001

Size	Composition									Return	Standard Deviation	MRPUR
1	NIG									0.00580	0.03549	0.16341
2	NIG	TUN								0.00395	0.01910	0.20684
3	NIG	TUN	SAF							0.00410	0.01768	0.23195
4	NIG	TUN	SAF	GHA						0.00328	0.01346	0.24323
5	NIG	TUN	SAF	GHA	IVC					0.00258	0.01208	0.21357
6	NIG	TUN	SAF	GHA	IVC	MAU				0.00182	0.01040	0.17470
7	NIG	TUN	SAF	GHA	IVC	MAU	MOR			0.00119	0.00993	0.11936
8	NIG	TUN	SAF	GHA	IVC	MAU	MOR	EGY		0.00078	0.01095	0.07075
9	NIG	TUN	SAF	GHA	IVC	MAU	MOR	EGY	KEN	0.00012	0.00912	0.01340

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 3-year period, 1999 - 2001.

Table 5.10.19A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2002 – 2004

Size	Composition										Return	Standard Deviation	MRPUR
1	MAU										0.00465	0.01274	0.36526
2	MAU	GHA									0.00623	0.01578	0.39467
3	MAU	GHA	EGY								0.00756	0.01748	0.43236
4	MAU	GHA	EGY	KEN							0.00691	0.01517	0.45515
5	MAU	GHA	EGY	KEN	NIG						0.00646	0.01408	0.45865
6	MAU	GHA	EGY	KEN	NIG	MOR					0.00544	0.01196	0.45462
7	MAU	GHA	EGY	KEN	NIG	MOR	TUN				0.00471	0.01052	0.44740
8	MAU	GHA	EGY	KEN	NIG	MOR	TUN	IVC			0.00442	0.01025	0.43084
9	MAU	GHA	EGY	KEN	NIG	MOR	TUN	IVC	SAF		0.00403	0.00988	0.40788
10	MAU	GHA	EGY	KEN	NIG	MOR	TUN	IVC	SAF	BOT	0.00342	0.00939	0.36390

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 3-year period, 2002 - 2004.

Table 5.10.20A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2005 – 2007

Size	Composition										Return	Standard Deviation	MRPUR
1	BOT										0.00925	0.02197	0.42099
2	BOT	TUN									0.00678	0.01303	0.52060
3	BOT	TUN	MAU								0.00655	0.01157	0.56608
4	BOT	TUN	MAU	IVC							0.00688	0.01177	0.58431
5	BOT	TUN	MAU	IVC	SAF						0.00643	0.01079	0.59586
6	BOT	TUN	MAU	IVC	SAF	NIG					0.00654	0.01092	0.59855
7	BOT	TUN	MAU	IVC	SAF	NIG	KEN				0.00617	0.01007	0.61299
8	BOT	TUN	MAU	IVC	SAF	NIG	KEN	MOR			0.00610	0.01027	0.59336
9	BOT	TUN	MAU	IVC	SAF	NIG	KEN	MOR	EGY		0.00643	0.01144	0.56160
10	BOT	TUN	MAU	IVC	SAF	NIG	KEN	MOR	EGY	GHA	0.00574	0.01073	0.53490

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 3-year period, 2005 - 2007.

Table 5.10.21A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2008 – 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00428	0.01553	0.27540
2	TUN	GHA									0.00344	0.01587	0.21694
3	TUN	GHA	IVC								0.00225	0.01329	0.16925
4	TUN	GHA	IVC	SAF							0.00188	0.01372	0.13722
5	TUN	GHA	IVC	SAF	MOR						0.00147	0.01237	0.11869
6	TUN	GHA	IVC	SAF	MOR	MAU					0.00129	0.01242	0.10348
7	TUN	GHA	IVC	SAF	MOR	MAU	BOT				0.00090	0.00997	0.08982
8	TUN	GHA	IVC	SAF	MOR	MAU	BOT	KEN			0.00060	0.01097	0.05513
9	TUN	GHA	IVC	SAF	MOR	MAU	BOT	KEN	EGY		0.00028	0.01361	0.02085
10	TUN	GHA	IVC	SAF	MOR	MAU	BOT	KEN	EGY	NIG	-0.00026	0.01400	-0.01890

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 3-year period, 2008 - 2010.

Table 5.10.22A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 1996 – 2000

Size	Composition								Return	Standard Deviation	MRPUR
1	MOR								0.00220	0.01808	0.12169
2	MOR	NIG							0.00240	0.01600	0.15003
3	MOR	NIG	MAU						0.00177	0.01236	0.14289
4	MOR	NIG	MAU	IVC					0.00150	0.01195	0.12550
5	MOR	NIG	MAU	IVC	EGY				0.00146	0.01249	0.11690
6	MOR	NIG	MAU	IVC	EGY	GHA			0.00123	0.01118	0.11027
7	MOR	NIG	MAU	IVC	EGY	GHA	SAF		0.00119	0.01169	0.10145
8	MOR	NIG	MAU	IVC	EGY	GHA	SAF	KEN	0.00074	0.01028	0.07173

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 8$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 5-year period, 1996 - 2000.

Table 5.10.23A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2001 – 2005

Size	Composition									Return	Standard Deviation	MRPUR
1	MAU									0.00276	0.01197	0.23037
2	MAU	EGY								0.00527	0.02198	0.23961
3	MAU	EGY	NIG							0.00514	0.01871	0.27499
4	MAU	EGY	NIG	GHA						0.00470	0.01566	0.30020
5	MAU	EGY	NIG	GHA	KEN					0.00434	0.01386	0.31297
6	MAU	EGY	NIG	GHA	KEN	SAF				0.00407	0.01267	0.32136
7	MAU	EGY	NIG	GHA	KEN	SAF	TUN			0.00355	0.01110	0.32023
8	MAU	EGY	NIG	GHA	KEN	SAF	TUN	IVC		0.00338	0.01082	0.31211
9	MAU	EGY	NIG	GHA	KEN	SAF	TUN	IVC	MOR	0.00306	0.01003	0.30556

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 9$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 5-year period, 2001 - 2005.

Table 5.10.24A
Local Currency Weekly Risk-Return Characteristics of the Ex-Post MRPUR – Optimal *K* Country Portfolios: 2006 – 2010

Size	Composition										Return	Standard Deviation	MRPUR
1	TUN										0.00442	0.01497	0.29550
2	TUN	IVC									0.00397	0.01485	0.26712
3	TUN	IVC	BOT								0.00361	0.01301	0.27719
4	TUN	IVC	BOT	GHA							0.00341	0.01191	0.28663
5	TUN	IVC	BOT	GHA	MAU						0.00340	0.01144	0.29740
6	TUN	IVC	BOT	GHA	MAU	MOR					0.00324	0.01107	0.29270
7	TUN	IVC	BOT	GHA	MAU	MOR	SAF				0.00305	0.01076	0.28377
8	TUN	IVC	BOT	GHA	MAU	MOR	SAF	KEN			0.00272	0.01116	0.24318
9	TUN	IVC	BOT	GHA	MAU	MOR	SAF	KEN	NIG		0.00245	0.01175	0.20862
10	TUN	IVC	BOT	GHA	MAU	MOR	SAF	KEN	NIG	EGY	0.00228	0.01342	0.17000

The table shows the composition and the risk-return characteristics of the local currency weekly optimal portfolio at each stage from $K = 1$ to $K = 10$, where K represents the portfolio size. In particular, the table details, for each portfolio size, the countries included in the portfolio and the portfolio return, standard deviation and mean return per unit of risk (MRPUR). The sample period considered spans the 5-year period, 2006 - 2010.

Appendix 6.1 Weekly Local Currency *Ex-Post* Optimal Portfolio MRPUR in Following Periods

Table 6.1A

Optimal Portfolio from Previous Period		Optimal Portfolio Performance in Following Period				Ex-Post Optimal in Following Period			UK-Only in Following Period	WI-Only in Following Period
Year	**Composition**	**Year**	**Return**	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1996	NIG, MOR	1997	0.00320	0.01861	0.17174	0.00470	0.01345	0.34913	0.18496	0.13771
1997	MOR, MAU	1998	0.00307	0.01439	0.21300	0.00307	0.01426	0.21495	0.09076	0.15118
1998	MOR, MAU	1999	-0.00124	0.01140	-0.10866	0.00841	0.01858	0.45274***	0.10985	0.18258
1999	SAF, TUN, EGY	2000	-0.00189	0.02448	-0.07706	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2000	NIG, TUN, GHA	2001	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2001	GHA	2002	0.00688	0.03038	0.22649	0.00500	0.01580	0.31622	-0.13987**	-0.11885**
2002	MAU, GHA	2003	0.00808	0.01365	0.59208	0.00894	0.01111	0.80470	0.09697***	0.23273**
2003	GHA, MAU, NIG, KEN, MOR, EGY, TUN	2004	0.00464	0.01000	0.46430	0.00681	0.01236	0.55090	0.09898**	0.16297*
2004	MAU, EGY, TUN	2005	0.00759	0.01479	0.51326	0.00687	0.00891	0.77057*	0.26812	0.12723**
2005	EGY, BOT, SAF, TUN, MOR, KEN, MAU	2006	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2006	BOT, TUN, GHA, MAU, KEN, NIG, IVC	2007	0.00642	0.01263	0.50833	0.00849	0.01330	0.63831	0.04936**	0.08339**
2007	IVC, MAU, EGY, BOT, NIG, GHA	2008	-0.00562	0.01789	-0.31415	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2008	GHA	2009	-0.00869	0.02464	-0.35257	0.00751	0.01273	0.59000***	0.13514	0.13891
2009	TUN	2010	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
1996 - 1998	MOR	1999 - 2001	-0.00258	0.02066	-0.12512	0.00368	0.01684	0.21858***	-0.03469	-0.04323
1999 - 2001	NIG, TUN, SAF, GHA	2002 - 2004	0.00343	0.01326	0.25822	0.00645	0.01407	0.45865**	-0.01776***	0.04111**
2002 - 2004	MAU, GHA, EGY, KEN, NIG	2005 - 2007	0.00518	0.01386	0.37375	0.00617	0.01007	0.61299**	0.12807**	0.12696**
2005 - 2007	BOT, TUN, MAU, IVC, SAF, NIG, KEN	2008 - 2010	-0.00037	0.01360	-0.02732	0.00428	0.01554	0.27540***	-0.01440	-0.04105
1996 - 2000	MOR, NIG	2001 – 2005	0.00275	0.01947	0.14121	0.00407	0.01267	0.32136**	-0.01317**	0.00757*
2001 - 2005	MAU, EGY, NIG, GHA, KEN, SAF	2006 - 2010	0.00157	0.01913	0.08191	0.00440	0.01500	0.29547***	0.00967	0.00120
Cumulative MRPUR During the Single-Year Periods 1997-2010					2.63451			7.04829	0.70843	0.78952
Average MRPUR During the Single-Year Periods 1997-2010					0.18818			0.50345***	0.05060	0.05639

This table shows the local currency results for the composition of the *ex-post* optimal portfolios within one period being used as out-of-sample portfolio inputs during the following period. Specifically the two left hand columns detail the periods examined and the composition of the *ex-post* optimal portfolios during that period. The following four columns then show the periods and performance of the resulting *ex-ante* portfolios based on the *ex-post* composition. In order to provide a comparison the remaining sections of the table show the actual *ex-post* optimal performance along with that of the UK- and World index-only portfolios during the forecasted period. In addition, the table reveals the cumulative and average performance during the single year periods 1997-2010, along with the result of a 2-sample t-test for the average performance. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.2 Currency Exchanged Three-Year Moving Average Forecasts

Table 6.2.1A

Panel A: Currency Exchanged Three Year Moving Average Equally Weighted Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	MOR	-0.00350	0.02450	-0.14285	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	TUN	-0.00300	0.01493	-0.20117	0.00354	0.02562	0.13796**	-0.10953	-0.12101
2002	NIG,TUN	-0.00234	0.01912	-0.12251	0.00276	0.01678	0.16451*	-0.13987	-0.16832
2003	NIG	0.00665	0.04630	0.14354	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	GHA, MAU	0.00317	0.02111	0.15015	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	EGY, MAU, MOR, SAF	0.00288	0.02695	0.10705	0.00688	0.01291	0.53270**	0.12317	0.03893
2007	BOT	0.00579	0.01920	0.30156	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	BOT, IVC, KEN, NIG, TUN	-0.00060	0.02423	-0.02493	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Three Year Moving Average Exponentially Weighted (1/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY, SAF	-0.00610	0.03595	-0.16967	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, MAU	0.00287	0.01348	0.21265	0.00788	0.01707	0.46169	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, KEN, MOR, NIG, SAF, TUN	0.00427	0.01721	0.24809	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	BOT, IVC, KEN, TUN	0.00598	0.01635	0.36586	0.01026	0.01554	0.66052*	0.04936*	0.07661*
2008	BOT, EGY, IVC, MAU, NIG	-0.00334	0.02624	-0.12724	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, GHA, MOR, TUN	-0.00327	0.02218	-0.14766	0.00533	0.01971	0.27040**	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (1/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.2.2A

Panel A: Currency Exchanged Three Year Moving Average Exponentially Weighted (2/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY, SAF	-0.00610	0.03595	-0.16967	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG, TUN	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, MAU	0.00287	0.01348	0.21265	0.00788	0.01707	0.46169	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, KEN, MOR, NIG, SAF, TUN	0.00427	0.01721	0.24809	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG	-0.00334	0.02624	-0.12724	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Three Year Moving Average Exponentially Weighted (3/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY, SAF	-0.00610	0.03595	-0.16967	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, KEN, MOR, NIG, SAF, TUN	0.00427	0.01721	0.24809	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.2.3A

Panel A: Currency Exchanged Three Year Moving Average Exponentially Weighted (4/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY	-0.00969	0.05302	-0.18279	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	GHA, MAU	0.00317	0.02111	0.15015	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, KEN, MOR, NIG, SAF, TUN	0.00427	0.01721	0.24809	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Three Year Moving Average Exponentially Weighted (5/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY, MOR	-0.00660	0.03190	-0.20674	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	GHA, MAU	0.00317	0.02111	0.15015	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	BOT, EGY, KEN, MOR, NIG, SAF, TUN	0.00427	0.01721	0.24809	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.2.4A

Panel A: Currency Exchanged Three Year Moving Average Exponentially Weighted (6/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MOR	-0.00229	0.01747	-0.13104	0.01049	0.02894	0.36237***	0.10985	0.19295
2000	EGY, MOR	-0.00660	0.03190	-0.20674	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG, TUN	-0.00234	0.01912	-0.12251	0.00276	0.01678	0.16451*	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	GHA, MAU	0.00317	0.02111	0.15015	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00789	0.01212	0.65109	0.26812	0.27014
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00364	0.02001	0.18167	0.00688	0.01291	0.53270**	0.12317	0.03893
2007	BOT	0.00579	0.01920	0.30156	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Three Year Moving Average Exponentially Weighted (7/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00145	0.01479	-0.09836	0.01049	0.02894	0.36237**	0.10985	0.19295
2000	EGY, MOR	-0.00660	0.03190	-0.20674	0.01054	0.04272	0.24665**	-0.09083	-0.05486
2001	TUN	-0.00300	0.01493	-0.20117	0.00354	0.02562	0.13796**	-0.10953	-0.12101
2002	NIG, TUN	-0.00234	0.01912	-0.12251	0.00276	0.01678	0.16451*	-0.13987	-0.16832
2003	NIG	0.00665	0.04630	0.14354	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	GHA, MAU	0.00317	0.02111	0.15015	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, GHA, MAU, SAF	0.00597	0.01732	0.34443	0.00789	0.01212	0.65109*	0.26812	0.27014
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00364	0.02001	0.18167	0.00688	0.01291	0.53270**	0.12317	0.03893
2007	BOT	0.00579	0.01920	0.30156	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	BOT, IVC, KEN, NIG, TUN	-0.00060	0.02423	-0.02493	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.3 Currency Exchanged Five-Year Moving Average Forecasts

Table 6.3.1A

Panel A: Currency Exchanged Five-Year Moving Average Equally Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	MOR, NIG	0.00120	0.02800	0.04275	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	NIG, SAF, TUN	0.00219	0.01321	0.16591	0.00880	0.02151	0.40880	0.09898	0.04837
2005	IVC, NIG, SAF	0.00593	0.01848	0.32065	0.00819	0.01289	0.63553*	0.26812	0.27014
2006	EGY, IVC, KEN, MAU, NIG, SAF	0.00312	0.01651	0.18897	0.00487	0.01131	0.43055	0.12317	0.03893
2007	BOT, EGY, IVC, KEN, MAU, NIG, SAF, TUN	0.00727	0.01274	0.57052	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	BOT, EGY, IVC, KEN, MAU, NIG, SAF, TUN	-0.00251	0.02518	-0.09950	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	BOT, IVC, TUN	0.00138	0.01236	0.11122	0.00632	0.01354	0.46676**	0.07167	0.10211
Panel B: Currency Exchanged Five-Year Moving Average Exponentially Weighted (1/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, MAU	0.00287	0.01348	0.21265	0.00788	0.01707	0.46169	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00819	0.01289	0.63553	0.26812	0.27014
2006	EGY, KEN, MOR, NIG, SAF, TUN	0.00360	0.01947	0.18510	0.00487	0.01131	0.43055	0.12317	0.03893
2007	BOT, IVC, KEN, TUN	0.00598	0.01635	0.36586	0.01026	0.01554	0.66052*	0.04936*	0.07661*
2008	BOT, EGY, IVC, MAU, NIG	-0.00334	0.02624	-0.12724	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, GHA, MOR, TUN	-0.00327	0.02218	-0.14766	0.00533	0.01971	0.27040**	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (1/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.3.2A

Panel A: Currency Exchanged Five-Year Moving Average Exponentially Weighted (2/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, MAU	0.00287	0.01348	0.21265	0.00788	0.01707	0.46169	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00819	0.01289	0.63553	0.26812	0.27014
2006	EGY, KEN, MOR, NIG, SAF, TUN	0.00360	0.01947	0.18510	0.00487	0.01131	0.43055	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG	-0.00334	0.02624	-0.12724	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Five-Year Moving Average Exponentially Weighted (3/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC	-0.00054	0.01805	-0.03018	0.00788	0.01707	0.46169***	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, MOR, SAF	0.00419	0.01422	0.29446	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00819	0.01289	0.63553	0.26812	0.27014
2006	EGY, KEN, MOR, NIG, SAF, TUN	0.00360	0.01947	0.18510	0.00487	0.01131	0.43055	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.3.3A

Panel A: Currency Exchanged Five-Year Moving Average Exponentially Weighted (4/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, NIG, SAF	0.00424	0.01431	0.29612	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MAU, SAF	0.00989	0.02051	0.48252	0.00819	0.01289	0.63553	0.26812	0.27014
2006	EGY, KEN, MOR, NIG, SAF, TUN	0.00360	0.01947	0.18510	0.00487	0.01131	0.43055	0.12317	0.03893
2007	BOT, IVC, KEN, NIG, TUN	0.00736	0.01666	0.44166	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, MOR, TUN	-0.00110	0.02048	-0.05379	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Five-Year Moving Average Exponentially Weighted (5/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG,	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	GHA, MAU, NIG, SAF	0.00326	0.01517	0.21464	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, GHA, MAU, SAF	0.00597	0.01732	0.34443	0.00819	0.01289	0.63553*	0.26812	0.27014
2006	EGY, KEN, MAU, MOR, SAF	0.00327	0.02360	0.13837	0.00487	0.01131	0.43055*	0.12317	0.03893
2007	BOT, KEN, TUN	0.00334	0.01547	0.21621	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00161	0.02448	-0.06574	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.3.4A

Panel A: Currency Exchanged Five-Year Moving Average Exponentially Weighted (6/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00573	0.04441	0.12908	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, NIG	0.00305	0.02529	0.12064	0.00788	0.01707	0.46169**	0.09697	0.12182
2004	MAU, NIG, SAF	0.00281	0.01475	0.19016	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, GHA, IVC, MAU, NIG, SAF	0.00586	0.01579	0.37126	0.00819	0.01289	0.63553*	0.26812	0.27014
2006	EGY, KEN, MAU, SAF	0.00238	0.02235	0.10651	0.00487	0.01131	0.43055*	0.12317	0.03893
2007	BOT, EGY, IVC, KEN, MAU, NIG, SAF, TUN	0.00727	0.01274	0.57052	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	BOT, EGY, IVC, KEN, MAU, NIG, TUN	-0.00230	0.02406	-0.09553	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211
Panel B: Currency Exchanged Five-Year Moving Average Exponentially Weighted (7/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	MOR, NIG	0.00120	0.02800	0.04275	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	NIG	-0.00216	0.03356	-0.06434	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	NIG	0.00665	0.04630	0.14354	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	MAU, NIG, SAF, TUN	0.00208	0.01155	0.17983	0.00880	0.02151	0.40880	0.09898	0.04837
2005	GHA, IVC, MAU, NIG, SAF	0.00300	0.01396	0.21479	0.00819	0.01289	0.63553**	0.26812	0.27014
2006	EGY, MAU, SAF	0.00158	0.02644	0.05965	0.00487	0.01131	0.43055**	0.12317	0.03893
2007	BOT, EGY, IVC, KEN, MAU, NIG, SAF, TUN	0.00727	0.01274	0.57052	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	BOT, EGY, IVC, KEN, MAU, NIG, SAF, TUN	-0.00251	0.02518	-0.09950	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	BOT, IVC, TUN	-0.00010	0.01780	-0.00540	0.00533	0.01971	0.27040*	0.13514	0.11220
2010	TUN	0.00220	0.01547	0.14221	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.4 Local Currency Three-Year Moving Average Forecasts

Table 6.4.1A

Panel A: Local Currency Three-Year Moving Average Equally-Weighted Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	MAU, MOR	-0.00317	0.01084	-0.29256	0.00578	0.01791	0.32289***	-0.09083	-0.13023
2001	NIG, TUN	0.00215	0.02085	0.10304	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	GHA, NIG, SAF, TUN	0.00104	0.01295	0.08068	0.00499	0.01579	0.31622	-0.13987	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	GHA, MAU, NIG	0.00459	0.01660	0.27637	0.00681	0.01236	0.55089*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU	0.00433	0.01407	0.30753	0.00687	0.00891	0.77057**	0.26812	0.12723
2006	EGY, GHA, KEN, MAU, MOR, NIG, SAF, TUN	0.00545	0.01456	0.37455	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, KEN, MAU, SAF, TUN	0.00385	0.01118	0.34480	0.00849	0.01330	0.63831*	0.04936*	0.08339*
2008	BOT, IVC, KEN, MAU, NIG, SAF, TUN	-0.00474	0.01597	-0.29672	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Three-Year Moving Average Exponentially Weighted (1/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, SAF	-0.00469	0.03352	-0.13996	0.00578	0.01791	0.32289**	-0.09083	-0.13023
2001	GHA, NIG, TUN	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2002	GHA	0.00688	0.03038	0.22649	0.00499	0.01579	0.31622	-0.13987**	-0.11885**
2003	GHA, MAU	0.00808	0.01365	0.59208	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00464	0.01000	0.46430	0.00681	0.01236	0.55089	0.09898**	0.16297*
2005	EGY, MAU, TUN	0.00759	0.01479	0.51326	0.00687	0.00891	0.77057*	0.26812	0.12723**
2006	BOT, EGY, KEN, MAU, MOR, SAF, TUN	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, GHA, IVC, KEN, MAU, NIG, TUN	0.00642	0.01263	0.50833	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, GHA, IVC, MAU, NIG,	-0.00562	0.01789	-0.31415	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	GHA,	-0.00869	0.02464	-0.35257	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.4.2A

Panel A: Local Currency Three-Year Moving Average Exponentially Weighted (2/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, SAF	-0.00469	0.03352	-0.13996	0.00578	0.01791	0.32289**	-0.09083	-0.13023
2001	GHA, NIG, TUN	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2002	GHA	0.00688	0.03038	0.22649	0.00499	0.01579	0.31622	-0.13987**	-0.11885**
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00464	0.01000	0.46430	0.00681	0.01236	0.55089	0.09898**	0.16297*
2005	EGY, GHA, KEN, MAU, TUN	0.00419	0.01083	0.38730	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	BOT, EGY, KEN, MAU, MOR, SAF, TUN	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, IVC, KEN, MAU, NIG, TUN	0.00673	0.01375	0.48951	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, GHA, IVC, MAU, NIG, TUN	-0.00453	0.01656	-0.27353	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	GHA, TUN	-0.00059	0.01449	-0.04057	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Three-Year Moving Average Exponentially Weighted (3/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, SAF	-0.00469	0.03352	-0.13996	0.00578	0.01791	0.32289**	-0.09083	-0.13023
2001	GHA, NIG, TUN	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00499	0.01579	0.31622	-0.13987*	-0.11885
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG	0.00522	0.01146	0.45526	0.00681	0.01236	0.55089	0.09898**	0.16297*
2005	EGY, GHA, KEN, MAU, TUN	0.00419	0.01083	0.38730	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	BOT, EGY, KEN, MAU, MOR, SAF, TUN	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, IVC, KEN, MAU, NIG, TUN	0.00673	0.01375	0.48951	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00586	0.01845	-0.31731	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.4.3A

Panel A: Local Currency Three-Year Moving Average Exponentially Weighted (4/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, MOR, SAF	-0.00451	0.02517	-0.17934	0.00578	0.01791	0.32289***	-0.09083	-0.13023
2001	GHA, NIG, TUN	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00499	0.01579	0.31622	-0.13987*	-0.11885
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG	0.00522	0.01146	0.45526	0.00681	0.01236	0.55089	0.09898**	0.16297*
2005	EGY, GHA, KEN, MAU, TUN	0.00419	0.01083	0.38730	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	BOT, EGY, KEN, MAU, MOR, SAF, TUN	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, EGY, IVC, MAU, NIG, TUN	-0.00586	0.01845	-0.31731	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Three-Year Moving Average Exponentially Weighted (5/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, MAU, MOR, SAF	-0.00393	0.01897	-0.20728	0.00578	0.01791	0.32289***	-0.09083	-0.13023
2001	GHA, NIG, TUN	0.00179	0.01392	0.12838	0.00106	0.00368	0.28878	-0.10953	-0.15236*
2002	GHA, NIG, SAF, TUN	0.00104	0.01295	0.08068	0.00499	0.01579	0.31622	-0.13987	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	IVC, MAU, NIG	0.00463	0.01767	0.26180	0.00681	0.01236	0.55089*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU	0.00433	0.01407	0.30753	0.00687	0.00891	0.77057**	0.26812	0.12723
2006	BOT, EGY, KEN, MAU, MOR, SAF, TUN	0.00688	0.01630	0.42213	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, IVC, MAU, NIG, SAF, TUN	-0.00410	0.01556	-0.26372	0.00341	0.01671	0.20408**	-0.18032	-0.2608
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.4.4A

Panel A: Local Currency Three-Year Moving Average Exponentially Weighted (6/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	EGY, MAU, MOR	-0.00516	0.01888	-0.27322	0.00578	0.01791	0.32289***	-0.09083	-0.13023
2001	NIG, TUN	0.00215	0.02085	0.10304	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	GHA, NIG, SAF, TUN	0.00104	0.01295	0.08068	0.00499	0.01579	0.31622	-0.13987	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	GHA, MAU, NIG	0.00459	0.01660	0.27637	0.00681	0.01236	0.55089*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU	0.00433	0.01407	0.30753	0.00687	0.00891	0.77057**	0.26812	0.12723
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, IVC, KEN, MAU, NIG, SAF, TUN	-0.00474	0.01597	-0.29672	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Three-Year Moving Average Exponentially Weighted (7/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	MAU, MOR	-0.00124	0.01140	-0.10866	0.01016	0.02585	0.39318***	0.10985	0.18258
2000	MAU, MOR	-0.00317	0.01084	-0.29256	0.00578	0.01791	0.32289***	-0.09083	-0.13023
2001	NIG, TUN	0.00215	0.02085	0.10304	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	GHA, NIG, SAF, TUN	0.00104	0.01295	0.08068	0.00499	0.01579	0.31622	-0.13987	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80468	0.09697***	0.23273**
2004	GHA, MAU, NIG	0.00459	0.01660	0.27637	0.00681	0.01236	0.55089*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU	0.00433	0.01407	0.30753	0.00687	0.00891	0.77057**	0.26812	0.12723
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, IVC, KEN, MAU, NIG, SAF, TUN	-0.00474	0.01597	-0.29672	0.00341	0.01671	0.20408***	-0.18032	-0.2608
2009	BOT, GHA, IVC, MOR, TUN	-0.00164	0.00971	-0.16867	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the three-year moving average forecasts of returns, standard deviations and correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.5 Local Currency Five-Year Moving Average Forecasts

Table 6.5.1A

Panel A: Local Currency Five-Year Moving Average Equally Weighted Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	MOR, NIG	0.00230	0.02529	0.09115	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	GHA, NIG, TUN	0.00341	0.01595	0.21364	0.00681	0.01236	0.55090**	0.09898	0.16297
2005	GHA, MAU, NIG	-0.00047	0.01602	-0.02902	0.00653	0.00925	0.70576***	0.26812	0.12723
2006	EGY, GHA, KEN, MAU, NIG, SAF, TUN	0.00515	0.01284	0.40104	0.00574	0.00845	0.67989*	0.12317*	0.17489
2007	BOT, EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00574	0.01070	0.53606	0.00849	0.01330	0.63831	0.04936***	0.08339**
2008	BOT, EGY, GHA, IVC, KEN, MAU, NIG, TUN	-0.00503	0.01675	-0.30062	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, EGY, GHA, KEN, MAU, NIG, TUN	0.00013	0.01781	0.00711	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	BOT, SAF, TUN	0.00114	0.00933	0.12215	0.00594	0.00959	0.61908***	0.07167	0.06017
Panel B: Local Currency Five Year Moving Average Exponentially Weighted (1/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00390	0.02009	0.19397	0.00106	0.00368	0.28878	-0.10953*	-0.15236**
2002	GHA	0.00688	0.03038	0.22649	0.00500	0.01580	0.31622	-0.13987**	-0.11885**
2003	GHA, MAU	0.00808	0.01365	0.59208	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00464	0.01000	0.46430	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	EGY, MAU, TUN	0.00759	0.01479	0.51326	0.00653	0.00925	0.70576	0.26812	0.12723**
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00574	0.00845	0.67989**	0.12317	0.17489
2007	BOT, GHA, IVC, KEN, MAU, NIG, TUN	0.00642	0.01263	0.50833	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, GHA, IVC, MAU, NIG	-0.00562	0.01789	-0.31415	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	GHA	-0.00869	0.02464	-0.35257	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (1/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.5.2A

Panel A: Local Currency Five Year Moving Average Exponentially Weighted (2/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00390	0.02009	0.19397	0.00106	0.00368	0.28878	-0.10953*	-0.15236**
2002	GHA	0.00688	0.03038	0.22649	0.00500	0.01580	0.31622	-0.13987**	-0.11885**
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00464	0.01000	0.46430	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	EGY, GHA, KEN, MAU, TUN	0.00419	0.01083	0.38730	0.00653	0.00925	0.70576*	0.26812	0.12723*
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00574	0.00845	0.67989**	0.12317	0.17489
2007	BOT, IVC, KEN, MAU, NIG, TUN	0.00673	0.01375	0.48951	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, GHA, IVC, MAU, NIG, TUN	-0.00453	0.01656	-0.27353	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Five Year Moving Average Exponentially Weighted (3/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00390	0.02009	0.19397	0.00106	0.00368	0.28878	-0.10953*	-0.15236**
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	EGY, GHA, KEN, MAU, MOR, NIG	0.00522	0.01146	0.45526	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	EGY, GHA, KEN, MAU, TUN	0.00419	0.01083	0.38730	0.00653	0.00925	0.70576*	0.26812	0.12723*
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00574	0.00845	0.67989**	0.12317	0.17489
2007	BOT, KEN, MAU, NIG, TUN	0.00562	0.01313	0.42765	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, GHA, IVC, MAU, NIG, TUN	-0.00453	0.01656	-0.27353	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.5.3A

Panel A: Local Currency Five Year Moving Average Exponentially Weighted (4/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00390	0.02009	0.19397	0.00106	0.00368	0.28878	-0.10953*	-0.15236**
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, MAU, NIG	0.00870	0.01341	0.64923	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	GHA, MAU, NIG	0.00459	0.01660	0.27637	0.00681	0.01236	0.55090*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU, NIG, TUN	0.00412	0.01068	0.38619	0.00653	0.00925	0.70576*	0.26812	0.12723*
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00574	0.00845	0.67989**	0.12317	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, EGY, GHA, IVC, MAU, NIG, TUN	-0.00453	0.01656	-0.27353	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Five Year Moving Average Exponentially Weighted (5/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00673	0.04037	0.16675	0.00106	0.00368	0.28878	-0.10953*	-0.15236*
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	GHA, MAU, NIG, TUN	0.00374	0.01292	0.28925	0.00681	0.01236	0.55090*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU, NIG, TUN	0.00412	0.01068	0.38619	0.00653	0.00925	0.70576*	0.26812	0.12723*
2006	EGY, KEN, MAU, MOR, SAF, TUN	0.00596	0.01931	0.30878	0.00574	0.00845	0.67989**	0.12317	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, EGY, GHA, IVC, KEN, MAU, NIG, TUN	-0.00503	0.01675	-0.30062	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.5.4A

Panel A: Local Currency Five Year Moving Average Exponentially Weighted (6/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	NIG	0.00673	0.04037	0.16675	0.00106	0.00368	0.28878	-0.10953*	-0.15236*
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	GHA, MAU, NIG, TUN	0.00374	0.01292	0.28925	0.00681	0.01236	0.55090*	0.09898	0.16297
2005	EGY, GHA, KEN, MAU, NIG	0.00422	0.01315	0.32050	0.00653	0.00925	0.70576**	0.26812	0.12723
2006	EGY, GHA, KEN, MAU, MOR, NIG, SAF, TUN	0.00545	0.01456	0.37455	0.00574	0.00845	0.67989*	0.12317	0.17489
2007	BOT, KEN, MAU, TUN	0.00417	0.01291	0.32285	0.00849	0.01330	0.63831*	0.04936*	0.08339
2008	BOT, EGY, GHA, IVC, KEN, MAU, NIG, TUN	-0.00503	0.01675	-0.30062	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, IVC, TUN	-0.00144	0.01105	-0.13000	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	TUN	0.00336	0.01359	0.24724	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Five Year Moving Average Exponentially Weighted (7/8) Forecasts for Returns Standard Deviations and Correlations									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	MOR, NIG	0.00230	0.02529	0.09115	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	GHA, NIG, SAF	0.00214	0.01696	0.12609	0.00500	0.01580	0.31622	-0.13987*	-0.11885
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	GHA, MAU, NIG, TUN	0.00374	0.01292	0.28925	0.00681	0.01236	0.55090*	0.09898	0.16297
2005	GHA, MAU, NIG	-0.00047	0.01602	-0.02902	0.00653	0.00925	0.70576***	0.26812	0.12723
2006	EGY, GHA, KEN, MAU, NIG, SAF, TUN	0.00515	0.01284	0.40104	0.00574	0.00845	0.67989*	0.12317*	0.17489
2007	BOT, EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00574	0.01070	0.53606	0.00849	0.01330	0.63831	0.04936***	0.08339**
2008	BOT, EGY, GHA, IVC, KEN, MAU, NIG, TUN	-0.00503	0.01675	-0.30062	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, GHA, TUN	-0.00103	0.01347	-0.07676	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	BOT, IVC, SAF, TUN	0.00203	0.00814	0.24944	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the five-year moving average forecasts of returns, standard deviations and correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.6 Currency Exchanged Three-Year Moving Average Correlation Only Forecasts

Table 6.6.1A

Panel A: Currency Exchanged Three-Year Moving Average Equally-Weighted Correlation Only Forecasts

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, SAF, TUN	0.00770	0.01279	0.60234	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.1339**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

Panel B: Currency Exchanged Three-Year Moving Average Exponentially Weighted (1/8) Correlation Only Forecasts

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF	0.00736	0.01606	0.45829	0.00788	0.01707	0.46169	0.09697**	0.12182**
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27040	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, NIG, SAF	0.00710	0.01756	0.40440	0.00632	0.01354	0.46676	0.07167**	0.10211*

This table shows the currency exchanged results for the three-year moving average forecasts of just correlations during the periods 1999 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (1/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.6.2A

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
Panel A: Currency Exchanged Three-Year Moving Average Exponentially Weighted (2/8) Correlation Only Forecasts									
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF	0.00736	0.01606	0.45829	0.00788	0.01707	0.46169	0.09697**	0.12182**
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, IVC, KEN, TUN	0.00596	0.01137	0.52431	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.1339**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Three-Year Moving Average Exponentially Weighted (3/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the three-year moving average forecasts of just correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.6.3A

Panel A: Currency Exchanged Three-Year Moving Average Exponentially Weighted (4/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Three-Year Moving Average Exponentially Weighted (5/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, IVC, KEN, TUN	0.00596	0.01137	0.52431	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the three-year moving average forecasts of just correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.6.4A

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
Panel A: Currency Exchanged Three-Year Moving Average Exponentially Weighted (6/8) Correlation Only Forecasts									
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Three-Year Moving Average Exponentially Weighted (7/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1999	EGY, SAF	0.01049	0.02894	0.36237	0.01049	0.02894	0.36237	0.10985	0.19295
2000	NIG	0.01054	0.04273	0.24665	0.01054	0.04272	0.24665	-0.09083**	-0.05486*
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	BOT, EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00753	0.01232	0.61112	0.00789	0.01212	0.65109	0.26812**	0.27014**
2006	BOT, TUN	0.00688	0.01291	0.53269	0.00688	0.01291	0.53270	0.12317**	0.03893***
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	MAU, SAF, TUN	0.00585	0.02174	0.26933	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the three-year moving average forecasts of just correlations during the periods 1999 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous three one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.7 Currency Exchanged Five-Year Moving Average Correlation Only Forecasts

Table 6.7.1A

Panel A: Currency Exchanged Five-Year Moving Average Equally Weighted Correlation Only Forecasts

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	GHA, IVC, MAU	0.00267	0.01893	0.14106	0.00276	0.01678	0.16451	-0.13987*	-0.16832*
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, SAF	0.00879	0.02151	0.40880	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	TUN	0.00549	0.01437	0.38206	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	TUN	0.00704	0.02309	0.30493	0.00704	0.02309	0.30490	-0.18032***	-0.13390**
2009	MAU, SAF, TUN	0.00585	0.02174	0.26933	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

Panel B: Currency Exchanged Five Year Moving Average Exponentially Weighted (1/8) Correlation Only Forecasts

Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF	0.00736	0.01606	0.45829	0.00788	0.01707	0.46169	0.09697**	0.12182**
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	IVC, KEN, TUN	0.00519	0.01301	0.39927	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, NIG, SAF	0.00710	0.01756	0.40440	0.00632	0.01354	0.46676	0.07167**	0.10211*

This table shows the currency exchanged results for the five-year moving average forecasts of just correlations during the periods 2001 – 2010. Panel A shows the equally weighted forecasts and Panel B the exponentially weighted (1/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.7.2A

Panel A: Currency Exchanged Five Year Moving Average Exponentially Weighted (2/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF	0.00736	0.01606	0.45829	0.00788	0.01707	0.46169	0.09697**	0.12182**
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	IVC, KEN, TUN	0.00519	0.01301	0.39927	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Five Year Moving Average Exponentially Weighted (3/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	IVC, KEN, TUN	0.00519	0.01301	0.39927	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG, TUN	0.00969	0.01563	0.61997	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	MAU, SAF, TUN	0.00585	0.02174	0.26933	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the five-year moving average forecasts of just correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (2/8) forecasts and Panel B the exponentially weighted (3/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.7.3A

Panel A: Currency Exchanged Five Year Moving Average Exponentially Weighted (4/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, IVC, MAU, SAF	0.00650	0.01693	0.38430	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	IVC, KEN, TUN	0.00519	0.01301	0.39927	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Five Year Moving Average Exponentially Weighted (5/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	IVC, MAU	0.00276	0.01679	0.16451	0.00276	0.01678	0.16451	-0.13987*	-0.16832**
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, SAF	0.00879	0.02151	0.40880	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	IVC, KEN, TUN	0.00519	0.01301	0.39927	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the five-year moving average forecasts of just correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (4/8) forecasts and Panel B the exponentially weighted (5/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.7.4A

Panel A: Currency Exchanged Five Year Moving Average Exponentially Weighted (6/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	GHA, IVC, MAU	0.00267	0.01893	0.14106	0.00276	0.01678	0.16451	-0.13987*	-0.16832*
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, SAF	0.00879	0.02151	0.40880	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	TUN	0.00549	0.01437	0.38206	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	GHA, TUN	0.00572	0.02025	0.28247	0.00704	0.02309	0.30490	-0.18032**	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**
Panel B: Currency Exchanged Five Year Moving Average Exponentially Weighted (7/8) Correlation Only Forecasts									
Year of Forecast	Optimal Portfolio from Forecast	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
2001	GHA, NIG	0.00353	0.02562	0.13796	0.00354	0.02562	0.13796	-0.10953	-0.12101*
2002	GHA, IVC, MAU	0.00267	0.01893	0.14106	0.00276	0.01678	0.16451	-0.13987*	-0.16832*
2003	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00658	0.01480	0.44433	0.00788	0.01707	0.46169	0.09697**	0.12182*
2004	EGY, SAF	0.00879	0.02151	0.40880	0.00880	0.02151	0.40880	0.09898*	0.04837**
2005	EGY, IVC, KEN, MOR, NIG, SAF, TUN	0.00773	0.01313	0.58908	0.00819	0.01289	0.63553	0.26812*	0.27014*
2006	TUN	0.00549	0.01437	0.38206	0.00487	0.01131	0.43055	0.12317*	0.03893**
2007	EGY, IVC, MAU, NIG	0.01138	0.01769	0.64334	0.01026	0.01554	0.66052	0.04936***	0.07661***
2008	TUN	0.00704	0.02309	0.30493	0.00704	0.02309	0.30490	-0.18032***	-0.13390**
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	GHA, KEN, MAU, SAF	0.00683	0.01495	0.45678	0.00632	0.01354	0.46676	0.07167**	0.10211**

This table shows the currency exchanged results for the five-year moving average forecasts of just correlations during the periods 2001 – 2010. Panel A shows the exponentially weighted (6/8) forecasts and Panel B the exponentially weighted (7/8). The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the previous five one-year periods. In addition the corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast period are detailed. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.8 Correlation Coefficients between Economic and Stock Market Indicator Variables and Stock Market Returns

Table 6.8A

Market	Turnover Ratio	Value of Stocks Traded (US$)	Value of Stocks Traded % GDP	Stock Market Capitalisation	Foreign Direct Investment (FDI)	Gross Domestic Product (GDP)	Inflation
BOT	-0.723**	-0.203	-0.546	0.372	0.017	0.233	0.378
EGY	0.005	-0.055	0.063	0.200	0.052	-0.169	0.016
GHA	0.567**	0.475*	0.261	0.434	0.238	0.323	-0.339
IVC	0.024	0.278	0.284	0.477*	0.221	0.304	-0.063
KEN	0.481*	0.240	0.353	0.348	0.092	0.172	-0.085
MAU	-0.030	0.332	0.316	0.604**	0.238	0.360	-0.143
MOR	0.153	0.132	0.188	0.300	0.466*	0.179	0.312
NIG	0.021	-0.107	-0.020	0.123	-0.299	-0.158	0.140
SAF	0.382	0.289	0.278	0.465*	-0.065	0.394	-0.466*
TUN	0.694***	0.601**	0.576**	0.510*	0.683**	0.654**	0.585**

This table shows the Pearson correlation coefficient for the various stock market and economic indicators used in construction of the indicator forecasts and the stock market returns within ten African emerging stock markets. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.9 Currency Exchanged Indicator Forecasts

Table 6.9.1A

Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
Panel A: Currency Exchanged Turnover Ratio Forecasts									
1998	GHA	0.00090	0.03207	0.02819	0.00355	0.01942	0.18272	0.09076	0.11738
1999	SAF	0.00899	0.03472	0.25888	0.00920	0.03470	0.26589	0.10985	0.19295
2000	IVC, MOR, TUN	0.00074	0.01885	0.03944	0.00705	0.02360	0.29858*	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	GHA, MAU	0.00210	0.01898	0.11087	0.00276	0.01678	0.16451	-0.13987	-0.16832*
2003	IVC, SAF	0.00210	0.01562	0.13451	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	GHA, IVC, KEN, MAU, NIG	0.00291	0.01685	0.17259	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, IVC	0.01259	0.03191	0.39460	0.00789	0.01212	0.65109	0.26812	0.27014
2006	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00301	0.01738	0.17313	0.00688	0.01291	0.53270**	0.12317	0.03893
2007	IVC, MOR	0.01018	0.02563	0.39729	0.01026	0.01554	0.66052*	0.04936**	0.07661*
2008	GHA, MAU, MOR, NIG, SAF	-0.00176	0.02600	-0.06778	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	MOR	0.00261	0.02627	0.09946	0.00632	0.01354	0.46676**	0.07167	0.10211
Panel B: Currency Exchanged Value of Stocks Traded Forecasts									
Year of Forecast	**Top Ranked Markets in Previous Period**	**Forecast Performance**			**Ex-Post Optimal**			**UK Only**	**WI Only**
		Return	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1998	GHA	0.00090	0.03207	0.02819	0.00355	0.01942	0.18272	0.09076	0.11738
1999	IVC	-0.00266	0.01807	-0.14702	0.00920	0.03470	0.26589**	0.10985	0.19295
2000	IVC, MOR, TUN	0.00074	0.01885	0.03944	0.00705	0.02360	0.29858*	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	MAU, NIG	-0.00022	0.02006	-0.01084	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, SAF	0.00210	0.01562	0.13451	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	BOT, GHA, KEN, MAU, NIG	0.00182	0.01520	0.11947	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	MOR, NIG	0.00504	0.01900	0.26551	0.00789	0.01212	0.65109**	0.26812	0.27014
2006	EGY, KEN, MAU, MOR, NIG, SAF, TUN	0.00367	0.01720	0.21361	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	IVC, MOR	0.01018	0.02563	0.39729	0.01026	0.01554	0.66052*	0.04936**	0.07661*
2008	BOT, GHA, MAU, MOR, NIG	-0.00046	0.02373	-0.01944	0.00704	0.02309	0.30490*	-0.18032	-0.13390
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	MOR, NIG	0.00261	0.02627	0.09946	0.00632	0.01354	0.46676**	0.07167	0.10211

This table shows the currency exchanged results for the indicator created forecasts during 1998 – 2010. Panel A shows the turnover ratio forecasts and Panel B the value of stock traded forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.9.2A

Panel A: Currency Exchanged Value of Stocks Traded as a Percent of GDP Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	GHA	0.00090	0.03207	0.02819	0.00355	0.01942	0.18272	0.09076	0.11738
1999	IVC	-0.00266	0.01807	-0.14702	0.00920	0.03470	0.26589**	0.10985	0.19295
2000	IVC, MOR, TUN	0.00074	0.01885	0.03944	0.00705	0.02360	0.29858*	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	MAU, NIG	-0.00022	0.02006	-0.01084	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	IVC, SAF	0.00210	0.01562	0.13451	0.00788	0.01707	0.46169*	0.09697	0.12182
2004	EGY, GHA, KEN, MAU, NIG	0.00413	0.01649	0.25058	0.00880	0.02151	0.40880	0.09898	0.04837
2005	EGY, MOR	0.01198	0.02485	0.48198	0.00789	0.01212	0.65109	0.26812	0.27014
2006	EGY, KEN, MAU, MOR, NIG, SAF, TUN	0.00367	0.01720	0.21361	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	IVC, MOR	0.01018	0.02563	0.39729	0.01026	0.01554	0.66052*	0.04936**	0.07661*
2008	BOT, GHA, MAU, MOR, NIG	-0.00046	0.02373	-0.01944	0.00704	0.02309	0.30490*	-0.18032	-0.13390
2009	TUN	0.00533	0.01971	0.27037	0.00533	0.01971	0.27040	0.13514	0.11220
2010	MOR	0.00261	0.02627	0.09946	0.00632	0.01354	0.46676**	0.07167	0.10211
Panel B: Currency Exchanged Stock Market Capitalisation Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	EGY	-0.00767	0.02516	-0.30505	0.00355	0.01942	0.18272***	0.09076	0.11738
1999	IVC	-0.00266	0.01807	-0.14702	0.00920	0.03470	0.26589**	0.10985	0.19295
2000	EGY, SAF, TUN	-0.00288	0.02694	-0.10700	0.00705	0.02360	0.29858**	-0.09083	-0.05486
2001	NIG, TUN	0.00136	0.02361	0.05780	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	GHA, NIG	0.00016	0.02693	0.00604	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	GHA, KEN	0.00943	0.03073	0.30700	0.00788	0.01707	0.46169	0.09697	0.12182
2004	GHA, KEN, MAU, MOR, NIG	0.00189	0.01489	0.12706	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	GHA, MOR	-0.00102	0.01887	-0.05416	0.00789	0.01212	0.65109***	0.26812	0.27014
2006	EGY, IVC, KEN, MAU, NIG, SAF, TUN	0.00346	0.01446	0.23916	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	GHA, MOR	0.00486	0.01845	0.26323	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	IVC, KEN, MAU, MOR, NIG	-0.00250	0.02640	-0.09479	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	GHA	-0.01293	0.03550	-0.36416	0.00533	0.01971	0.27040***	0.13514	0.11220
2010	SAF	0.00568	0.03321	0.17095	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the indicator created forecasts during 1998 – 2010. Panel A shows the value of stocks traded as a percent of GDP forecasts and Panel B the stock market capitalisation forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.9.3A

Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
Panel A: Currency Exchanged Foreign Direct Investment Forecasts									
1998	SAF	-0.00718	0.06235	-0.11514	0.00355	0.01942	0.18272*	0.09076	0.11738
1999	MOR	-0.00229	0.01747	-0.13104	0.00920	0.03470	0.26589**	0.10985	0.19295
2000	KEN, MAU, SAF	-0.00317	0.01481	-0.21398	0.00705	0.02360	0.29858***	-0.09083	-0.05486
2001	MAU, MOR	-0.00357	0.01626	-0.21943	0.00354	0.02562	0.13796**	-0.10953	-0.12101
2002	IVC, SAF	0.00296	0.02683	0.11037	0.00276	0.01678	0.16451	-0.13987	-0.16832*
2003	KEN, TUN	0.00688	0.02849	0.24141	0.00788	0.01707	0.46169	0.09697	0.12182
2004	GHA, KEN, MAU, NIG, MOR	0.00189	0.01489	0.12706	0.00880	0.02151	0.40880*	0.09898	0.04837
2005	EGY, IVC	0.01259	0.03191	0.39460	0.00789	0.01212	0.65109	0.26812	0.27014
2006	EGY, IVC, MAU, MOR, NIG, SAF, TUN	0.00375	0.01722	0.21758	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	GHA, TUN	0.00310	0.01152	0.26900	0.01026	0.01554	0.66052**	0.04936	0.07661
2008	GHA, IVC, KEN, MAU, NIG	-0.00247	0.02663	-0.09262	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	GHA	-0.01293	0.03550	-0.36416	0.00533	0.01971	0.27040***	0.13514	0.11220
2010	KEN	0.00518	0.02143	0.24177	0.00632	0.01354	0.46676	0.07167	0.10211
Panel B: Currency Exchanged Gross Domestic Product (GDP) Forecasts									
Year of Forecast	**Top Ranked Markets in Previous Period**	**Forecast Performance**			**Ex-Post Optimal**			**UK Only**	**WI Only**
		Return	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1998	EGY	-0.00767	0.02516	-0.30505	0.00355	0.01942	0.18272***	0.09076	0.11738
1999	MOR	-0.00229	0.01747	-0.13104	0.00920	0.03470	0.26589**	0.10985	0.19295
2000	EGY, NIG, TUN	0.00147	0.02504	0.05853	0.00705	0.02360	0.29858	-0.09083	-0.05486
2001	EGY, NIG	-0.00277	0.03236	-0.08570	0.00354	0.02562	0.13796	-0.10953	-0.12101
2002	GHA, NIG	0.00016	0.02693	0.00604	0.00276	0.01678	0.16451	-0.13987	-0.16832
2003	GHA, NIG	0.00683	0.02537	0.26904	0.00788	0.01707	0.46169	0.09697	0.12182
2004	BOT, GHA, IVC, MOR, SAF	0.00379	0.01585	0.23885	0.00880	0.02151	0.40880	0.09898	0.04837
2005	NIG, SAF	0.00639	0.01920	0.33271	0.00789	0.01212	0.65109*	0.26812	0.27014
2006	EGY, GHA, IVC, KEN, MOR, NIG, SAF	0.00295	0.01775	0.16643	0.00688	0.01291	0.53270**	0.12317	0.03893
2007	GHA, NIG	0.00805	0.01984	0.40602	0.01026	0.01554	0.66052	0.04936**	0.07661*
2008	EGY, GHA, KEN, MAU, MOR	-0.00218	0.02655	-0.08196	0.00704	0.02309	0.30490**	-0.18032	-0.13390
2009	NIG	-0.01075	0.06811	-0.15780	0.00533	0.01971	0.27040**	0.13514	0.11220
2010	EGY	0.00186	0.03418	0.05432	0.00632	0.01354	0.46676**	0.07167	0.10211

This table shows the currency exchanged results for the indicator created forecasts during 1998 – 2010. Panel A shows the Foreign Direct Investment forecasts and Panel B the Gross Domestic Product forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.9.4A

Currency Exchanged Inflation Forecasts									
Year of Forecast	Top Inflation Indicator Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	NIG	-0.00670	0.02092	-0.32037	0.00355	0.01942	0.18272***	0.09076	0.11738
1999	GHA	-0.00600	0.02080	-0.28820	0.00920	0.03470	0.26589***	0.10985	0.19295
2000	IVC, MOR, NIG	0.00307	0.02202	0.13954	0.00705	0.02360	0.29858	-0.09083	-0.05486
2001	EGY, MAU	-0.00754	0.02203	-0.34215	0.00354	0.02562	0.13796***	-0.10953	-0.12101
2002	KEN, MOR	-0.00297	0.01561	-0.19046	0.00276	0.01678	0.16451**	-0.13987	-0.16832
2003	GHA, KEN	0.00943	0.03073	0.30700	0.00788	0.01707	0.46169	0.09697	0.12182
2004	IVC, MAU, MOR, SAF, TUN	0.00294	0.01268	0.23195	0.00880	0.02151	0.40880	0.09898	0.04837
2005	IVC, SAF	0.00573	0.02258	0.25385	0.00789	0.01212	0.65109**	0.26812	0.27014
2006	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00352	0.01510	0.23315	0.00688	0.01291	0.53270*	0.12317	0.03893
2007	IVC, NIG	0.01338	0.02734	0.48930	0.01026	0.01554	0.66052	0.04936**	0.07661**
2008	BOT, KEN, MOR, NIG, TUN	-0.00039	0.02356	-0.01674	0.00704	0.02309	0.30490*	-0.18032	-0.13390
2009	MAU	0.00587	0.03683	0.15928	0.00533	0.01971	0.27040	0.13514	0.11220
2010	IVC	0.00364	0.02109	0.17260	0.00632	0.01354	0.46676*	0.07167	0.10211

This table shows the currency exchanged results for the indicator forecasts based on inflation during 1998 – 2010. The table details the composition, return, standard deviation and MRPUR of the *ex-ante* optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.10 Local Currency Indicator Forecasts

Table 6.10.1A

Panel A: Local Currency Turnover Ratio Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	GHA, SAF	-0.00065	0.03138	-0.02074	0.00307	0.01426	0.21495	0.09076	0.15118
1999	NIG, SAF	0.00436	0.02272	0.19181	0.0102	0.02594	0.39318	0.10985	0.18258
2000	IVC, MOR, TUN	0.00054	0.01508	0.03590	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2001	MAU, NIG, TUN	0.00052	0.01436	0.03647	0.00106	0.00368	0.28878	-0.10953	-0.15236
2002	MAU	0.00311	0.01236	0.25125	0.00500	0.01580	0.31622	-0.13987**	-0.11885**
2003	IVC, SAF	-0.00022	0.01844	-0.01175	0.00894	0.01111	0.8047***	0.09697	0.23273
2004	BOT, EGY, GHA, IVC, KEN, MAU, NIG	0.00546	0.01266	0.43120	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	EGY, IVC, MOR	0.00867	0.02018	0.42977	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	EGY, GHA, KEN, MAU, MOR, SAF, TUN	0.00537	0.01668	0.32203	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, EGY, IVC, KEN, MOR, NIG, SAF	0.00656	0.01339	0.48994	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, GHA, MAU, MOR, NIG, SAF	-0.00370	0.01510	-0.24524	0.00341	0.01671	0.20408**	-0.18032	-0.26080
2009	TUN	0.00751	0.01273	0.59000	0.00751	0.01273	0.59000	0.13514**	0.13891**
2010	MOR	0.00332	0.02467	0.13478	0.00594	0.00959	0.61908***	0.07167	0.06017
Panel B: Local Currency Value of Stocks Traded Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	GHA, MOR	0.00245	0.01947	0.12571	0.00307	0.01426	0.21495	0.09076	0.15118
1999	IVC, MOR	-0.00106	0.00976	-0.10897	0.0102	0.02594	0.39318***	0.10985	0.18258
2000	IVC, MOR, TUN	0.00054	0.01508	0.03590	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2001	EGY, NIG, TUN	-0.00137	0.02008	-0.06815	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	NIG	0.00161	0.02602	0.06176	0.00500	0.01580	0.31622	-0.13987	-0.11885
2003	IVC, SAF	-0.00022	0.01844	-0.01175	0.00894	0.01111	0.80470***	0.09697	0.23273
2004	BOT, EGY, GHA, IVC, MAU, NIG, SAF	0.00576	0.01360	0.42331	0.00681	0.01236	0.55090	0.09898*	0.16297*
2005	IVC, MOR, NIG	0.00440	0.01629	0.26986	0.00687	0.00891	0.77057***	0.26812	0.12723
2006	EGY, KEN, MAU, MOR, NIG, SAF, TUN	0.00597	0.01651	0.36164	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, EGY, IVC, KEN, MOR, NIG, SAF	0.00656	0.01339	0.48994	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, GHA, IVC, MAU, MOR, NIG	-0.00338	0.01580	-0.21389	0.00341	0.01671	0.20408**	-0.18032	-0.26080
2009	TUN	0.00751	0.01273	0.59003	0.00751	0.01273	0.59000	0.13514**	0.13891**
2010	MOR	0.00332	0.02467	0.13478	0.00594	0.00959	0.61908***	0.07167	0.06017

This table shows the local currency results for the indicator created forecasts during 1998 – 2010. Panel A shows the turnover ratio forecasts and Panel B the value of stock traded forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.10.2A

Panel A: Local Currency Value of Stocks Traded as Percent of Gross Domestic Product Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	GHA, MOR	0.00245	0.01947	0.12571	0.00307	0.01426	0.21495	0.09076	0.15118
1999	IVC, SAF	0.00421	0.01759	0.23909	0.0102	0.02594	0.39318	0.10985	0.18258
2000	IVC, MOR, TUN	0.00054	0.01508	0.03590	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2001	EGY, NIG, TUN	-0.00137	0.02008	-0.06815	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	NIG	0.00161	0.02602	0.06176	0.00500	0.01580	0.31622	-0.13987	-0.11885
2003	IVC, SAF	-0.00022	0.01844	-0.01175	0.00894	0.01111	0.8047***	0.09697	0.23273
2004	BOT, EGY, GHA, IVC, KEN, MAU, NIG	0.00546	0.01266	0.43120	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	EGY, IVC, MOR	0.00867	0.02018	0.42977	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	EGY, KEN, MAU, MOR, NIG, SAF, TUN	0.00597	0.01651	0.36164	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, EGY, IVC, KEN, MOR, NIG, SAF	0.00656	0.01339	0.48994	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, GHA, IVC, MAU, MOR, NIG	-0.00338	0.01580	-0.21389	0.00341	0.01671	0.20408**	-0.18032	-0.26080
2009	TUN	0.00751	0.01273	0.59000	0.00751	0.01273	0.59000	0.13514**	0.13891**
2010	MOR	0.00332	0.02467	0.13478	0.00594	0.00959	0.61908***	0.07167	0.06017
Panel B: Local Currency Stock Market Capitalisation Forecasts									
Year of Forecast	Top Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	EGY, MOR	-0.00217	0.01512	-0.14365	0.00307	0.01426	0.21495**	0.09076	0.15118
1999	IVC, MOR	-0.00106	0.00976	-0.10897	0.0102	0.02594	0.39318***	0.10985	0.18258
2000	EGY, SAF, TUN	-0.00189	0.02448	-0.07706	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2001	KEN, NIG, TUN	-0.00069	0.01524	-0.04547	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	NIG	0.00161	0.02602	0.06176	0.00500	0.01580	0.31622	-0.13987	-0.11885
2003	GHA, KEN	0.01172	0.02113	0.55479	0.00894	0.01111	0.80470	0.09697**	0.23273*
2004	GHA, IVC, KEN, MAU, MOR, NIG, SAF	0.00383	0.01168	0.32747	0.00681	0.01236	0.55090	0.09898	0.16297
2005	GHA, MOR, SAF	0.00094	0.01320	0.07158	0.00687	0.00891	0.77057***	0.26812	0.12723
2006	EGY, IVC, KEN, MAU, NIG, SAF, TUN	0.00570	0.01363	0.41825	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, GHA, IVC, KEN, MOR, NIG, TUN	0.00600	0.01329	0.45177	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, EGY, IVC, MAU, MOR, NIG	-0.00643	0.01937	-0.33186	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	GHA	-0.00869	0.02464	-0.35257	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	SAF	0.00302	0.02162	0.13971	0.00594	0.00959	0.61908***	0.07167	0.06017

This table shows the local currency results for the indicator created forecasts during 1998 – 2010. Panel A shows the value of stocks traded as a percent of GDP forecasts and Panel B the stock market capitalisation forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.10.3A

Panel A: Local Currency Foreign Direct Investment Forecasts									
Year of Forecast	**Top Ranked Markets in Previous Period**	**Forecast Performance**			**Ex-Post Optimal**			**UK Only**	**WI Only**
		Return	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1998	IVC, SAF	-0.00180	0.03297	-0.05470	0.00307	0.01426	0.21495*	0.09076	0.15118
1999	GHA, MOR	-0.00026	0.01005	-0.02587	0.01020	0.02594	0.39318**	0.10985	0.18258
2000	KEN, MAU, SAF	-0.00213	0.01208	-0.17656	0.00509	0.01306	0.38996***	-0.09083	-0.13023
2001	MAU, MOR, TUN	-0.00243	0.01024	-0.23692	0.00106	0.00368	0.28878***	-0.10953	-0.15236
2002	SAF	-0.00207	0.02705	-0.07655	0.00500	0.01580	0.31622**	-0.13987	-0.11885
2003	KEN, TUN	0.00775	0.02065	0.37561	0.00894	0.01111	0.8047**	0.09697*	0.23273
2004	BOT, GHA, IVC, KEN, MAU, MOR, NIG	0.00364	0.01199	0.30367	0.00681	0.01236	0.55090	0.09898	0.16297
2005	EGY, IVC, TUN	0.00860	0.01986	0.43321	0.00687	0.00891	0.77057**	0.26812	0.12723*
2006	EGY, IVC, MAU, MOR, NIG, SAF, TUN	0.00590	0.01655	0.35621	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, EGY, GHA, KEN, MAU, MOR, TUN	0.00493	0.01020	0.48298	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	GHA, IVC, KEN, MAU, MOR, NIG	-0.00489	0.01859	-0.26308	0.00341	0.01671	0.20408**	-0.18032	-0.26080
2009	GHA	-0.00869	0.02464	-0.35257	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	KEN	0.00568	0.02190	0.25938	0.00594	0.00959	0.61908**	0.07167	0.06017
Panel B: Local Currency Gross Domestic Product Forecasts									
Year of Forecast	**Top Ranked Markets in Previous Period**	**Forecast Performance**			**Ex-Post Optimal**			**UK Only**	**WI Only**
		Return	**StDev**	**MRPUR**	**Return**	**StDev**	**MRPUR**	**MRPUR**	**MRPUR**
1998	EGY, KEN	-0.00417	0.01443	-0.28905	0.00307	0.01426	0.21495***	0.09076	0.15118
1999	IVC, MOR	-0.00106	0.00976	-0.10897	0.0102	0.02594	0.39318***	0.10985	0.18258
2000	EGY, NIG, TUN	0.00190	0.01980	0.09612	0.00509	0.01306	0.38996*	-0.09083	-0.13023
2001	EGY, MAU, NIG	-0.00147	0.01912	-0.07667	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	GHA	0.00688	0.03038	0.22649	0.00500	0.01580	0.31622	-0.13987**	-0.11885**
2003	GHA, NIG	0.00998	0.01718	0.58077	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	BOT, GHA, IVC, MAU, MOR, SAF, TUN	0.00375	0.01267	0.29616	0.00681	0.01236	0.55090	0.09898	0.16297
2005	BOT, NIG, SAF	0.00644	0.01347	0.47832	0.00687	0.00891	0.77057*	0.26812	0.12723**
2006	EGY, GHA, IVC, KEN, MOR, NIG, SAF	0.00495	0.01702	0.29065	0.00669	0.00779	0.85887***	0.12317	0.17489
2007	BOT, EGY, GHA, KEN, MOR, NIG, TUN	0.00539	0.01149	0.46957	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	EGY, GHA, KEN, MAU, MOR, NIG	-0.00697	0.02325	-0.29963	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	NIG	-0.00743	0.06443	-0.11532	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	EGY	0.00222	0.03499	0.06342	0.00594	0.00959	0.61908***	0.07167	0.06017

This table shows the local currency results for the indicator created forecasts during 1998 – 2010. Panel A shows the Foreign Direct Investment forecasts and Panel B the Gross Domestic Product forecasts. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Table 6.10.4A

Currency Exchanged Inflation Forecasts									
Year of Forecast	Top Inflation Indicator Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1998	MOR, NIG	-0.00016	0.00992	-0.01653	0.00307	0.01426	0.21495	0.09076	0.15118
1999	GHA, KEN	-0.00196	0.00914	-0.21409	0.0102	0.02594	0.39318***	0.10985	0.18258
2000	IVC, MOR, NIG	0.00301	0.01874	0.16037	0.00509	0.01306	0.38996	-0.09083	-0.13023*
2001	EGY, MAU, SAF	-0.00226	0.01829	-0.12344	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	MOR	-0.00479	0.02151	-0.22260	0.00500	0.01580	0.31622***	-0.13987	-0.11885
2003	GHA, KEN	0.01172	0.02113	0.55479	0.00894	0.01111	0.80470	0.09697**	0.23273*
2004	IVC, MAU, MOR, SAF, TUN	0.00354	0.01218	0.29053	0.00681	0.01236	0.55090*	0.09898	0.16297
2005	GHA, IVC, SAF	0.00151	0.01632	0.09253	0.00687	0.00891	0.77057***	0.26812	0.12723
2006	EGY, GHA, KEN, MAU, MOR, NIG, TUN	0.00556	0.01443	0.38554	0.00669	0.00779	0.85887**	0.12317*	0.17489
2007	BOT, EGY, GHA, IVC, KEN, NIG, SAF	0.00647	0.01318	0.49073	0.00849	0.01330	0.63831	0.04936**	0.08339**
2008	BOT, IVC, KEN, MOR, NIG, TUN	-0.00366	0.01579	-0.23209	0.00341	0.01671	0.20408**	-0.18032	-0.26080
2009	MAU	0.00666	0.03329	0.19996	0.00751	0.01273	0.59000**	0.13514	0.13891
2010	IVC	0.00470	0.01713	0.27441	0.00594	0.00959	0.61908**	0.07167	0.06017

This table shows the local currency results for the indicator forecasts based on inflation during 1998 – 2010. The table details the composition, return, standard deviation and MRPUR of the *ex*-ante optimal portfolios identified through examination of the change in each indicator during the previous period. In addition the table contains corresponding *ex-post* optimal, UK and World index-only portfolios during the forecast periods. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.

Appendix 6.11 Local Currency Naïve 1/N Diversification Strategy

Table 6.11A

Year of Forecast	Top Three Indicator Ranked Markets in Previous Period	Forecast Performance			Ex-Post Optimal			UK Only	WI Only
		Return	StDev	MRPUR	Return	StDev	MRPUR	MRPUR	MRPUR
1996	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF	0.00253	0.00741	0.34107	0.00654	0.00680	0.96036***	0.14591	0.16203
1997	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF	0.00125	0.01200	0.10439	0.00470	0.01345	0.34913	0.18496	0.13771
1998	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00098	0.00978	-0.10064	0.00307	0.01426	0.21495*	0.09076	0.15118
1999	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00198	0.00908	0.21830	0.00841	0.01858	0.45274	0.10985	0.18258
2000	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00026	0.01059	-0.02453	0.00509	0.01306	0.38996**	-0.09083	-0.13023
2001	EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00132	0.00994	-0.13309	0.00106	0.00368	0.28878**	-0.10953	-0.15236
2002	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00005	0.00818	0.00606	0.00500	0.01580	0.31622*	-0.13987	-0.11885
2003	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00582	0.00891	0.65286	0.00894	0.01111	0.80470	0.09697***	0.23273**
2004	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00445	0.01017	0.43762	0.00681	0.01236	0.55090	0.09898**	0.16297*
2005	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00497	0.00894	0.55599	0.00687	0.00891	0.77057	0.26812*	0.12723**
2006	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00617	0.01216	0.50749	0.00669	0.00779	0.85887**	0.12317**	0.17489**
2007	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00608	0.01102	0.55199	0.00849	0.01330	0.63831	0.04936***	0.08339**
2008	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00461	0.01722	-0.26748	0.00341	0.01671	0.20408***	-0.18032	-0.26080
2009	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	-0.00004	0.01340	-0.00300	0.00751	0.01273	0.59000***	0.13514	0.13891
2010	BOT, EGY, GHA, IVC, KEN, MAU, MOR, NIG, SAF, TUN	0.00394	0.00888	0.44323	0.00594	0.00959	0.61908	0.07167**	0.06017**

This table shows the local currency results of the naïve *1/N* diversification strategy. Specifically the table shows the composition of African stock markets used within each out-of-sample period along with the return, standard deviation and MRPUR of the resulting *ex-ante* portfolios. In order to provide a comparison the remaining sections of the table show the actual *ex-post* optimal performance along with that of the UK- and World index-only portfolios during the forecasted period. An * indicates significance at the ten percent level, while ** indicates significance at the five percent level and *** indicates significance at the one percent level.